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**THE
SILENT
DISEASE**

**Achievements and Challenges
in Hypertension Control**

Achievements and Challenges in Hypertension Control

The inclusion in this issue of **PUBLIC HEALTH REPORTS** of several successful research and community projects dealing with hypertension control is timely for several reasons. July 1982 marks the 10th anniversary of the National High Blood Pressure Education Program. Although incontrovertible proof of cause and effect is not possible, there are a number of associations that point to a strong temporal relationship between the efforts of the program—leading to improved hypertension control—and the decline in hypertension-associated deaths. Through the actions of many, in this decade the nation has achieved a high level of public awareness about high blood pressure, a marked increase in the number of patients under treatment for hypertension, more appropriate treatment regimens, and a greater proportion of hypertensive patients achieving long-term control. These achievements have been associated with the desired objective of reducing the occurrence of cardiovascular disease. During the past decade the age-adjusted mortality has declined 37 percent for stroke and 25 percent for coronary heart disease. This outcome is one in which the nation as a whole, the large number of high blood pressure researchers and health care providers, and the National Heart, Lung, and Blood Institute may take great pride.

A second reason these articles are timely is that strong emphasis is now being placed on disease prevention at the national level. Earlier the predominant voices were those of people in the health professions and in the general public who were skeptical about preventive methods. With successful application of the results of scientific investigation and implementation of control programs, it appears that chronic disease prevention can be effective nationwide. This possibility increases the likelihood that additional chronic diseases may be prevented in comparable fashion.

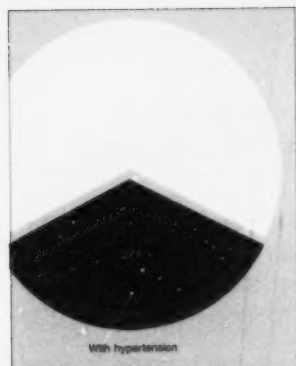
A last, though hardly a final, reason that these articles are timely is that they demonstrate how much more we still have to learn and to achieve. Perhaps the most important point of all, especially in the face of sizeable recent progress, is that we are far from finished with the task of controlling hypertension. We must assiduously avoid any sense of complacency. The progress we have achieved thus far may be the easier part of the job. Many difficult questions still have to be answered before we can consider the hypertension problem solved. We know little about, and have made relatively little progress in overcoming the barriers to hypertension control in hard-to-reach segments of the population. Although weight reduction and salt restriction are effective for many, we currently lack adequate scientific evidence of benefit and prac-

tical methods to implement non-pharmacological intervention for large numbers of people. We need better methods to disseminate information that is convincing to providers, patients, and the public. Dietary factors are strongly implicated in hypertension and in the etiology of cardiovascular disease in general. High relative weight and high sodium intake are significantly associated with hypertension in population studies; and in the clinical setting, lowering of body weight and sodium consumption is associated with decreases in blood pressure. The connection between cause and effect in clinical studies—the proof of efficacy in preventing hypertension—is very plausible, but it remains incompletely proven; this fact has tempered the firmness with which we have made recommendations to the public.

Primary prevention of hypertension is an ultimate objective, but this will likely require better understanding of the mechanisms that control high blood pressure. Much remains for researchers at the bench and in the field.

Peter L. Frommer, MD
Acting Director
National Heart, Lung, and
Blood Institute

Graham W. Ward, MPH
Coordinator, National High
Blood Pressure Education
Program, National Heart,
Lung, and Blood Institute



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Address correspondence to:
Editor, Public Health Reports
Room 10-44 Center Bldg.
3700 East-West Highway
Hyattsville, Md. 20782
AC 301-436-8992

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Cover—The National Heart, Lung, and Blood Institute's "Silent Disease" TV package has been produced by dozens of stations and cable systems. Dr. Frank Douglas of the Institute serves as volunteer medical guest for the Cox Cable version of the presentation with hostess Jane Simons, formerly with Cox. Filming was in the National Institutes of Health studio.

Information media have been important tools in the 10-year antihypertension campaign. Five reports of progress in that campaign are highlighted in this issue of Public Health Reports.

Determinants of Drug Treatment Maintenance Among Hypertensive Persons in Inner City Detroit

K. MICHAEL CUMMINGS, PhD, MPH
JOHN P. KIRSCHT, PhD
LAURENCE R. BINDER, BA
ALEGRO J. GODLEY, MD, MPH

IT IS CLEAR FROM PUBLISHED REPORTS that the failure of patients to remain under continuous medical care and inability or unwillingness of patients to adhere to a prescribed treatment are major obstacles to the successful treatment of hypertension (1-3). Although some screening and referral programs have demonstrated success in getting patients to a physician for confirmatory diagnosis and initiation of treatment, post-referral dropouts from treatment are known to be extremely high, especially if followup is not continuous (4-6). According to findings of population surveys and screening campaigns, between 15 to 30 percent of known hypertensives begin, but later terminate treatment, and less than 70 percent of those persons who continue with treatment evidence blood pressure control within the normal range (6-11). Several studies also show that blood pressure control is a greater problem among blacks than among whites. Studies of the patients of private physicians and those attending medical clinics indicate that between 50 and 60 percent of the patients fail to take medications as prescribed and that many patients eventually discontinue treatment altogether (12-15).

The problem of patient adherence to medical recommendations is a complex one. With respect to hypertension specifically, an analysis of dropouts by Caldwell and co-workers (2) suggested the involvement of several factors including socioeconomic status, education regarding the disease, and the patient's beliefs about

the severity of the condition and perceived value of adhering to the treatment. Kirscht and Rosenstock (16) report similar findings from a study of patient adherence to antihypertensive medical regimens in a group of 132 patients of private physicians. Patients' beliefs about their susceptibility to the sequelae of hypertension (that is, heart attack, stroke, and so forth), about the severity of the condition, and the efficacy of the prescribed regimen were all associated with adherence.

Studies by Finnerty and co-workers (15,17) on dropouts from hypertension treatment emphasized barriers to care, especially in the area of physician-patient relationships. In interviews with patients who had dropped out of treatment, inconvenient clinic hours, lengthy waiting room stays, and insufficient time for consultation with health professionals were the most frequently mentioned reasons for dropping out of treatment. Changes in office procedures, such as replacing open clinic hours with an appointment system, offering services during some evenings and weekends, and establishing an oncall telephone service dramatically reduced the number of dropouts from treatment. Wilber and Barrow reported a similar followup experience with hypertensives detected in a community program in Georgia (6). In a more recent study of dropouts among hypertensive patients, Gillum and co-workers (18) concluded that the severity of illness, coupled with the costs and inconvenience of care and lack of physician enthusiasm for the treatment of mild hypertension, are the major factors leading to dropouts from treatment.

This study examines the relationship of health beliefs, knowledge about hypertension, barriers to receiving medical care, and personal characteristics to drug treatment maintenance in a group of 206 hypertensives. In addition dropouts from treatment were questioned regarding their reasons for discontinuing therapy. The findings from this study are used to suggest ways to enhance treatment maintenance.

Dr. Cummings is research scientist, Department of Cancer Control and Epidemiology, Roswell Park Memorial Institute. Dr. Kirscht is professor, Department of Health Behavior and Health Education, School of Public Health, University of Michigan. Mr. Binder is biostatistician, and Dr. Godley is director, Detroit Hypertension Control Program, Detroit Health Department.

This research was supported by grant No. HL-22380-1 from the National Heart, Lung, and Blood Institute.

Reprints requests to K. Michael Cummings, PhD, MPH, Department of Cancer Control and Epidemiology, Roswell Park Memorial Institute, 666 Elm St., Buffalo, N.Y. 14263.

Method

The data analyzed in this paper are a subset of the data collected in the Detroit Hypertension Study, a 5-year demonstration program designed to evaluate the effectiveness of an intensive blood pressure screening, referral, and followup effort in increasing the number of controlled hypertensives in an inner area of that city with a predominantly black population. The research design for the study involves a comparison of two matched areas, one exposed to the blood pressure screening, referral, and followup program and the other without any special blood pressure control services. The two areas were matched on the basis of the proportion of whites and blacks in each area, the age distribution and the educational and income levels of the areas' populations, and the general housing characteristics of each community (that is, proportion of single and multiple dwelling units). Each area is comprised of 13 census tracts, containing about 50,000 adults. The study is now in its fourth year. The data we discuss come from a baseline survey of the two areas conducted in the fall of 1978.

Sample survey. A two-stage probability sample was drawn to represent the noninstitutionalized population of adults (aged 18 and older) residing in the two study areas. In the first stage of the sample, 1,400 households (700 in each area) were selected at random from the city directory. The directory listing was supplemented by information on new construction and demolition as well as updated listings from earlier surveys in the areas. Addresses which included five or more housing units were separately listed and sampled. If an address covered four or fewer housing units, all four units were included in the sample.

In the second stage of the sample, a random selection procedure was used to select one adult in each designated household to be interviewed (19). Of the 1,400 addresses sampled, 221 were dropped because the units were vacant, the addresses selected were not private households, or the addresses could not be located. Trained interviewers conducted interviews and measured the blood pressure levels of 773 respondents, representing an overall response rate of 66 percent of the eligible sample. Comparison of respondents and nonrespondents revealed that males below age 40 were less likely to participate in the interview than were older men or women. As a result, the sample underrepresents younger men in the population.

Blood pressure measurements were obtained according to a standard protocol by trained interviewers who were periodically tested for accuracy of measurement. Three consecutive readings were obtained on each per-

son interviewed and the average of the last two 5th-phase diastolic pressures was used to define blood pressure level. For this analysis, a person was considered hypertensive if the average diastolic pressure was greater than 95 mm Hg or if the diastolic pressure was less than 95 mm Hg and the person was under a physician's care for treatment of high blood pressure.

The prevalence of hypertension in the combined survey populations was 35 percent. Of the 271 hypertensives identified, 14 percent (38 persons) were unaware of their hypertension and 10 percent (27 persons) were previously aware of their hypertension but never received treatment. The analyses presented in this paper are based on the 206 hypertensives who were previously or currently on drug treatment for high blood pressure. The chart illustrates how respondents were identified for data analysis.

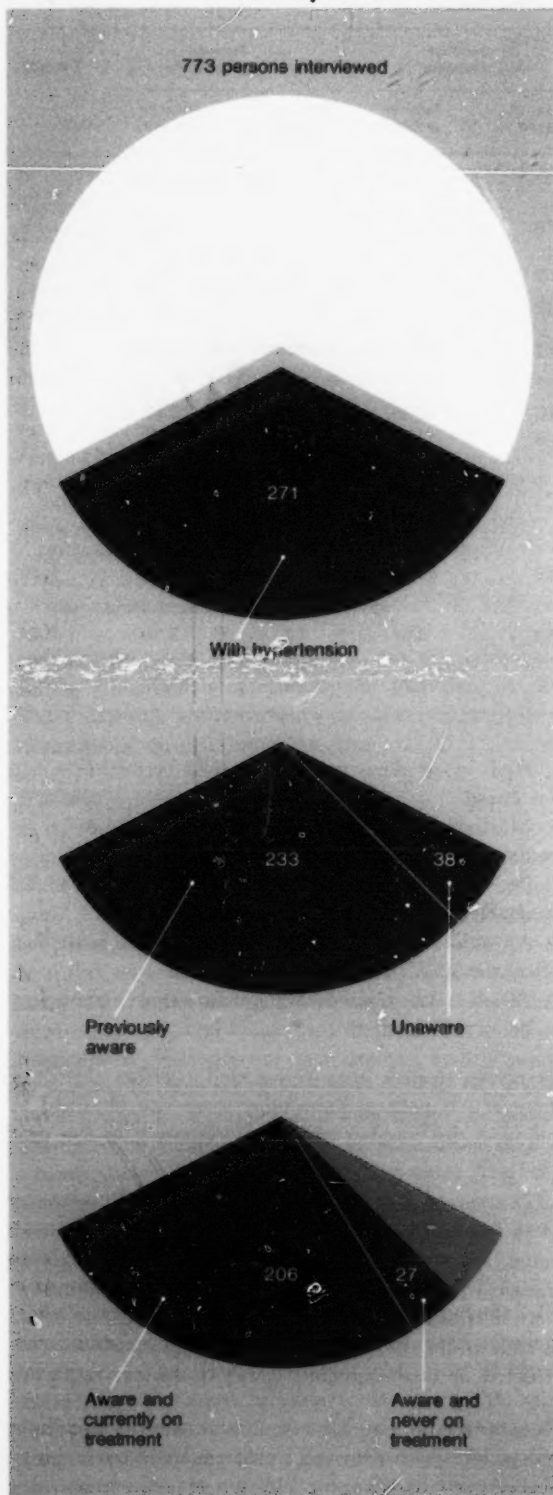
Sociodemographic characteristics of respondents. The average age of the 206 respondents was 58 years. Twenty-nine percent of respondents were male, and 97 percent were black. The median annual family income was less than \$4,000, with 38 percent making between \$4,000 and \$10,000 annually and 24 percent making more than \$10,000 annually. Only one-third of the respondents finished high school. Thirty-seven percent of the group were married, 6 percent had never married, and the remainder were widowed, divorced, or separated. Payment sources for medical care included Medicaid (21 percent), Medicare (29 percent), Blue Cross or another carrier (41 percent), and 9 percent were uninsured.

Medical characteristics of respondents. The average diastolic blood pressure of the 206 respondents was 89 mm Hg, but 29 percent had average diastolic readings above 95 mm Hg. Forty-nine percent of the group reported that hypertension was their only health problem. Of the 104 reporting other chronic health problems, 63 percent reported having heart trouble, 36 percent reported diabetes, 45 percent reported kidney trouble, 13 percent had had a stroke, and 37 percent had arthritis.

Drug treatment maintenance. Treatment maintenance was defined as continuing to take antihypertensive medication following a diagnosis of hypertension. Operationally, the drug treatment maintenance variable was defined by constructing a dichotomous variable to distinguish between hypertensives currently on drug treatment for high blood pressure and those who, at the time of the interview, were no longer on treatment although they had not been advised by a physician to discontinue taking their blood pressure medicine.

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Respondents in Detroit survey of hypertension



Independent variables. The psychosocial factors examined were intended to cover a range of variables that have been shown in other studies to be related to adherence.

Perceived susceptibility to the sequelae of hypertension. A 3-item index was developed to represent the respondents' views about their susceptibility to the potentially harmful health effects of hypertension. Items included the likelihood of having (a) heart disease, (b) stroke, and (c) kidney disease. All items were measured on a 5-point scale ranging from definitely yes to definitely no. The index was constructed by computing the mean of the three items: the internal consistency coefficient of the index is 0.71.

Perceived severity of hypertension. A single item was used to measure the respondents' perception of the severity of hypertension. They were asked to rate how serious a health problem they considered high blood pressure to be on a 4-point scale ranging from very serious to not at all serious.

Benefits of antihypertensive therapy. A 6-item index measuring the respondent's beliefs about the benefits of following the physician's advice about treatment of high blood pressure was developed. Items in the index included (a) prevention of heart disease, (b) prevention of stroke, (c) prevention of kidney disease, (d) lowering blood pressure, (e) living a longer life, and (f) living a normal life. All items were measured on a 7-point scale ranging from no chance to certain. The index was constructed by computing the mean of the six items. The internal consistency coefficient of the index is 0.79.

Barriers to treatment maintenance. Four separate measures of the barriers to treatment maintenance were constructed. The first measure dealt with the respondent's view of how difficult it was to follow the physician's advice. Respondents were asked to rate how much trouble it was to follow this advice on a 4-point scale ranging from no trouble to a lot of trouble. The second measure was a 5-item index which dealt with access to medical care. Respondents were asked if they had ever delayed visiting or talking with a physician about a health condition because (a) they couldn't get an appointment, (b) they didn't have the money, (c) they didn't know whether their medical insurance would pay for the cost of treatment, (d) they didn't know where to go to get medical care, and (e) they didn't have a way to get to a doctor. The index was constructed by counting the number of "yes" responses

Table 1. Health beliefs, barriers to receiving medical care, and knowledge of hypertension of persons who stopped taking antihypertensive medications and persons who continued taking medications

Variable	Currently on drug treatment		Stopped drug treatment		P value
	Number of persons	Mean or percent	Number of persons	Mean or percent	
<i>Health beliefs</i>					
Index of perceived susceptibility to the sequelae of hypertension	159	1.72	43	1.69	0.81
Percent rating hypertension as a "very serious" health problem	163	87.5	43	76.7	0.21
Index of beliefs in the benefits of treatment for hypertension .	158	4.88	42	4.97	0.47
Percent reporting difficulty in following their physician's medical advice	161	40.9	43	39.5	0.28
<i>Barriers to medical care</i>					
Number of barriers to accessing medical care	163	0.90	43	0.81	0.53
Usual source of medical care	163	...	43	...	0.86
Percent with no regular source	...	7.4	...	9.3	...
Percent with private physician	...	50.3	...	53.4	...
Percent using hospital outpatient clinic	...	28.8	...	20.9	...
Percent using neighborhood health clinics including HMOs .	...	11.6	...	13.9	...
Percent using health department clinic	...	1.8	...	12.3	...
Percent reporting medical insurance	158	90.5	42	95.2	0.33
<i>Knowledge of hypertension</i>					
Correct responses in general knowledge test	163	5.57	42	5.30	0.34
Correct responses on knowledge of health problems hypertension can cause	163	1.31	43	1.09	0.16

to these five items. The third measure dealt with the respondent's source of medical care. Respondents were asked to indicate the place where they usually went when ill or in need of medical advice. Responses were coded as (a) no regular source of medical care, (b) private physician's office, (c) hospital outpatient clinic, (d) neighborhood health clinic, and (e) health department clinic. The fourth barrier measure concerned whether the respondent had medical insurance that paid for ambulatory care.

Knowledge about hypertension. Two measures of a respondent's knowledge about hypertension were constructed. The first assessed the respondent's general knowledge about high blood pressure and its treatment. Respondents were asked to indicate whether they agreed or disagreed with the following nine statements about high blood pressure:

1. A person who has high blood pressure is usually tense and nervous.
2. Blacks are more likely to have high blood pressure than whites.
3. All people with high blood pressure take the same medicine.
4. People with high blood pressure usually have headaches, nosebleeds, or dizzy spells.

5. High blood pressure can be helped by medicine, but not cured.

6. It is normal for a person's blood pressure to go up and down over the course of a day.

7. Doctors tell people with high blood pressure to eat more salty foods.

8. An individual's weight has nothing to do with high blood pressure.

9. People with high blood pressure have too much blood in their system.

Responses to each item were coded as either correct or incorrect. A general knowledge score was obtained by counting the number of correct responses to the nine items.

The second measure assessed respondents' knowledge of the health problems that high blood pressure can cause. A mention of heart disease, stroke, or kidney disease was coded as a correct response. Respondents were encouraged to mention as many health problems as they could think of. The knowledge score was constructed by counting the number of correct responses.

Data analysis. The statistical association between the independent variables and treatment maintenance variable was evaluated using either a chi-square test or a

ACHIEVEMENTS AND CHALLENGES IN HYPERTENSION CONTROL

Table 2. Comparison of characteristics of persons who stopped taking antihypertension medications and persons who continued taking medications

Variable	Currently on drug treatment		Stopped drug treatment		P value
	Number of persons	Percent	Number of persons	Percent	
<i>Sociodemographic characteristics</i>					
Percent male	163	30.1	43	25.6	0.56
Mean age (years)	162	59.1	42	55.3	0.11
Percent who were married	163	37.4	42	33.3	0.51
Percent who were high school graduates or better	161	33.5	43	30.2	0.90
Percent with total family income greater than \$10,000 per year .	135	24.4	34	23.4	0.64
<i>Health status and blood pressure</i>					
Percent rating their health status as excellent or good	162	28.9	43	41.9	0.04
Percent who report having had heart trouble	161	36.0	42	19.0	0.04
Percent who report having had a stroke	160	7.5	43	4.7	0.51
Percent who report having had kidney trouble	158	20.9	43	27.0	0.33
Mean number of months on drug treatment for high blood pressure	156	95.6	43	87.3	0.71
Percent with diastolic blood pressure below 90 mm Hg	162	54.3	43	60.5	0.47
Mean diastolic blood pressure (mm Hg) ¹	161	89.1	42	87.6	0.57

¹ Mean diastolic blood pressure adjusted for age.

two-sample *t*-test as appropriate. In the tables that follow, the number of cases in the treatment maintenance category are not always the same due to isolated instances of missing interview data.

Results

Forty-three of the 206 respondents reported discontinuing drug treatment for their high blood pressure without being advised by a physician to do so. Of these 43 respondents, 20 indicated that they were still following other types of antihypertensive therapy such as a diet or exercise regimen. Overall, 183 of the 206 respondents reported being on some form of antihypertensive therapy, and 89 percent of the 183 were taking medications. Sixty percent were advised by a physician to reduce the amount of salt in their diet, 41 percent were advised by a physician to lose weight, 24 percent were advised by a physician to exercise more, and 17 percent were told to stop smoking cigarettes. The combination of antihypertensive medications and a low sodium diet was the most commonly reported therapy (74 percent).

Determinants of drug treatment maintenance. The association of health beliefs, barriers to receiving medical care, and knowledge variables with drug treatment maintenance is shown in table 1. Among health belief variables, there was a slight tendency for persons who stopped taking their blood pressure medicine to view hypertension as less serious a condition than persons

who continued taking their medicine. Those who discontinued drug treatment differed very little from those who remained in treatment in terms of perceptions about personal susceptibility to the sequelae of hypertension, beliefs in the benefits of treatment for hypertension, and reported difficulty in following a physician's advice.

Regarding barriers to receiving medical care, persons who discontinued drug treatment actually reported fewer problems gaining access to care than persons who continued to take their blood pressure medicine. Persons who stopped taking their blood pressure medicine were also more likely to report having medical insurance than persons currently receiving drug treatment for their hypertension.

In terms of knowledge about hypertension, those receiving drug treatment for hypertension scored slightly higher than persons who discontinued drug treatment on the measure of general knowledge of high blood pressure and on the measure of knowledge of the health problems that high blood pressure can cause. However, the differences observed were not statistically significant at the 5 percent level.

Table 2 shows the relationship between discontinuing drug treatment for hypertension and selected sociodemographic characteristics and health status variables. Sociodemographic characteristics such as sex, age, marital status, educational level, and annual family income level are poor discriminators between persons

Table 3. Main reason given by 43 respondents for discontinuing antihypertensive medications

Main reason for discontinuing	Percent of respondents
Experiencing side effects from medicine	7.0
Treatment costs a lot of money	11.6
Prescription had run out	20.9
Felt fine without the medicine	39.5
Medicine was inconvenient to take	4.7
Just got tired of taking medication	4.7
Physician moved	2.3
Fear of becoming addicted to the medication	2.3
Don't know	7.0

who continue drug treatment and those who stopped taking their blood pressure medicine.

Two health status items did distinguish between persons who continue drug treatment from those who discontinue it. First, those perceiving their health status to be poorer are more likely to continue taking blood pressure medicine. Second, respondents who report having had heart trouble in the past are more likely to continue to take their blood pressure medicine. There is no difference between persons who stopped taking antihypertensive medications and persons who continued to take their blood pressure medicine in the length of time that they had been on drug treatment for this condition.

With regard to blood pressure control, there were no differences in the percentage of respondents with controlled blood pressure (that is, diastolic reading of less than 90 mm Hg) or age-adjusted average diastolic blood pressure between persons currently or previously on drug treatment.

Comparison of the 20 persons who discontinued drug therapy but continued other forms of antihypertensive therapy with the 23 persons who discontinued all forms of antihypertensive therapy revealed no statistically significant difference in health beliefs, access to care variables, knowledge about hypertension, sociodemographic characteristics, health status measures, or blood pressure. (Data on these comparisons are not shown.)

Reasons for discontinuing drug treatment. Respondents who discontinued drug treatment for high blood pressure were questioned regarding their reasons for doing so. Table 3 summarizes the reasons given for dropping out of drug treatment. Of the 43 in this group, 39.5 percent reported that they felt good without the medicine. Nine persons, or 20.9 percent, reported they had discontinued drug treatment because the prescriptions for their medicine had run out, and five persons, or 11.9 percent, reported that they dis-

Table 4. Why 113 respondents sometimes missed taking blood pressure medicine

Reasons for missing blood pressure medicine	Percent of respondents indicating reason
Forget to take the medicine	58.5
Prescription for the medicine ran out	57.8
Treatment costs a lot of money	13.2
Experiencing side effects from medicine	24.1
Felt fine without the medicine	38.9
Away from home	39.1
Wanted to see how I felt without the medicine	38.6
Too many pills to take	19.8

continued drug treatment because the medicine was costing them a lot of money. Only three persons (7 percent) reported side effects as a reason for discontinuing drug treatment, and only two (4.7 percent) reported dropping out of drug treatment because the medicine was inconvenient to take.

Reasons for not taking medicine as prescribed. Of the 163 persons on drug treatment for high blood pressure, 70 percent (113 persons) reported having missed taking their blood pressure medicine at least once. Table 4 presents the reasons they gave for missing. The most common included forgetting to take the medicine (58 percent), being away from home (39 percent), feeling fine without the medicine (39 percent), and wanting to see how they felt without the medicine (39 percent). Only 24 percent of those who reported ever missing taking their blood pressure medicine mentioned side effects as a reason for noncompliance, and only 13 percent reported treatment costs as a reason.

Sixty-seven respondents (41 percent) reported that they had special ways which they used to help remember to take their blood pressure medicine. The most frequently mentioned methods included taking the medicine at mealtimes (28 percent), taking the medicine at a specific time of day (21 percent), or placing the medication in a location where it would be easily remembered (29 percent). Only three people indicated that they depended upon someone else to help them remember to take their medicine, and only two people reported using a written chart to help them remember to take their medicine.

Discussion

The respondents' perception of their health status seems to be an important factor influencing their decision to continue drug treatment. Our findings showed that poorer perceived health status was associated with continuing to take blood pressure medicine. Perceived

health status was found to be positively correlated with the number of health problems reported by an individual ($r = 0.41$). This observation may reflect the fact that those with more health problems are more likely to be under treatment regularly and more likely to visit a physician within a given period. Other health problems, such as diabetes or arthritis, may provide occasions to see a physician, and blood pressure is then coincidentally given care. Thus, regular contact with a physician for other health problems may be the important intervening factor.

The most common reason for discontinuing treatment by persons who stopped taking their blood pressure medicine was that they felt well without the medicine. Given the asymptomatic nature of hypertension, it is conceivable that many of those who discontinued treatment did so because they saw no need to continue therapy. Interestingly, the same reason, "feeling fine without the medicine," was mentioned by more than one-third of those persons currently taking blood pressure medicine as a reason for failing to take medication. Gillum and co-workers (18) reported a similar finding in a study of dropouts among hypertensive patients seen in a medical clinic. They reported that patients with less severe hypertension, with no symptoms, and without other chronic ailments were more likely to discontinue therapy. It was suggested that the low perceived severity of the illness, coupled with a lack of enthusiasm of the provider in treating and following up patients with uncomplicated hypertension, leads to a lack of concern by the patient for treating the condition. Conversely, physicians may treat those patients with several conditions more vigorously and more continuously.

Side effects associated with the treatment were not a major determinant of discontinuing drug treatment. Only 7 percent of those who stopped taking their blood pressure medicine reported side effects from the medication as their main reason for discontinuing drug treatment. Similarly, fewer than one in four persons currently taking blood pressure medicine mentioned side effects as a reason for occasionally failing to take their blood pressure medicine.

Health beliefs generally were not predictive of discontinuing drug treatment. There was a slight tendency for persons who stopped taking their blood pressure medicine to view hypertension as less serious a condition than persons continuing drug treatment. Persons who discontinued drug treatment were also slightly less knowledgeable about high blood pressure and the health problems high blood pressure can cause than persons who continued to take their blood pressure medicine.

Variables measuring access to medical care did not distinguish between persons who discontinued drug

treatment and those who continued treatment. In fact, our findings indicated that persons who stopped taking their blood pressure medicine actually had fewer problems gaining access to medical care than did persons who continued to take their blood pressure medicine. However, this finding may be confounded by the fact that persons who discontinued taking antihypertensive medications had fewer health problems than persons who continued to take their medications and, as a result, would probably have less contact with the medical care system and less opportunity to experience difficulty gaining access to care. Finally, in the present study we found no strong relationship between sociodemographic variables and discontinuing drug therapy.

The lack of difference in age-adjusted diastolic blood pressure readings and blood pressure control status between those who stopped taking their blood pressure medicine and those who continued cannot be explained by the fact that many of the persons who discontinued drug therapy were still on other forms of antihypertensive therapy. Comparisons yielded little difference in age-adjusted diastolic blood pressure and blood pressure control status. One explanation for this lack of difference between persons who stopped taking their blood pressure medicine and persons who continued to take their medications is that those with less severe hypertension are more prone to discontinue drug treatment. It is also possible that, among persons who continued to take their blood pressure medicine, failure to adhere closely to the prescribed medication regimen may reduce the effectiveness of treatment. It is also conceivable that respondents were not accurately reporting their status or that they had misinterpreted what a physician told them about taking their medications.

The percentage of persons who reported discontinuing treatment for hypertension in this study was low compared with the proportion in other studies. For instance, Gillum and co-workers (18) reported dropout rates between 30 and 50 percent after 2 years of treatment for hypertensive patients in an urban medical clinic, and Caldwell and co-workers (2) reported that 62 percent of hypertensives drop out of treatment after 2 years. The lower rate of discontinuing treatment we observed may be related to the cross-sectional study design employed. It is likely that, at any point in time, between 10 and 20 percent of known hypertensives will not be in treatment. However, it is also likely that many of those persons currently in treatment have discontinued treatment at sometime in the past and will discontinue treatment sometime in the future. It is possible that variables found to be unrelated to discontinuing drug treatment in this study would be predictive of treatment maintenance in a prospective study.

Practically speaking, the findings from this study point out the need for providers to emphasize to their hypertensive patients the need to continue to take their blood pressure medicine and comply with their treatment regimen even when they feel well. A number of studies have demonstrated that compliance can be enhanced through increased provider supervision or vigorous followup or both (4, 6, 17, 20-23).

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SYNOPSIS

CUMMINGS, K. MICHAEL (Roswell Park Memorial Institute), KIRSCHT, JOHN P., BINDER, LAURENCE R., and GODLEY, ALEGRO, J.: *Determinants of drug treatment maintenance among hypertensive persons in inner city Detroit. Public Health Reports*, Vol. 97, March-April 1982, pp. 99-106.

Drug treatment maintenance among a group of 206 hypertensive persons was examined in relation to their health beliefs, knowledge about hypertension, barriers to receiving medical care, health status, and personal characteristics. The data came from

a cross-sectional survey of approximately 800 adults living in Detroit, Mich., which included blood pressure measurements of respondents. Treatment maintenance was defined as continuing to take antihypertensive medication following a diagnosis of hypertension.

Twenty-one percent of the 206 hypertensives interviewed reported discontinuing drug treatment for their high blood pressure without being advised by a physician to do so. The only factor that distinguished dropouts from nondropouts was the respondents' perception of their health status; the poorer a person perceived his or

her health to be, the more likely the person was to remain in treatment. Among persons who dropped out of drug treatment, the most common reason given for discontinuing was that they felt well without the medicine.

Given the asymptomatic nature of hypertension, it is suggested that many of those who stop taking medication do so because they see no need to continue therapy. The findings from this study point out the need for providers to emphasize to their hypertensive patients the reasons for continuing on treatment even when they feel well.

Data-Based Planning for Educational Interventions Through Hypertension Control Programs for Urban and Rural Populations in Maryland

DAVID M. LEVINE, MD, ScD
DONALD E. MORISKY, MSPH, ScD
LEE R. BONE, BSN, MPH
CAROL LEWIS, MSW, MPH
WILLIAM B. WARD, DrPH
LAWRENCE W. GREEN, DrPH

HYPERTENSION, OR HIGH BLOOD PRESSURE (HBP), remains one of the most prominent health problems in the United States and is estimated to affect some 60 million adults. It has major effects on cardiovascular and cerebrovascular morbidity and mortality, and it is responsible for the loss of productive years of work and increased costs of health care (1,2).

During the past 10 years, studies have demonstrated that more than 90 percent of persons with hypertension can have their blood pressure controlled if adequate health care is provided (3). Yet, despite medical advances in the detection, treatment, and control of HBP, large proportions of those with hypertension have either dropped out of care (4) or do not comply adequately with treatment regimens to achieve blood

pressure control (5). Moreover, estimates indicate that approximately 50 percent of persons found to have elevated blood pressures, particularly young males, are not getting into care (6).

In an effort to address this national problem, the National Institutes of Health in 1977 supported public health experiments in four States (Maryland, California, Connecticut, and South Carolina). The goal was to determine whether statewide efforts using existing resources, and coordinated by the State health departments, could improve high blood pressure control. In Maryland, the planning and monitoring of these activities has been carried out by a State coordinating council composed of an executive committee and 10 statewide standing committees. The 27-member execu-

Dr. Levine is a senior staff member of the Johns Hopkins Health Services Research and Development Center and professor and acting chairperson, Department of Behavioral Sciences, Johns Hopkins School of Hygiene and Public Health. Dr. Morisky is senior research associate of the center. Ms. Bone is a research associate in the Department of Health Services Administration, Division of Health Education, Johns Hopkins School of Hygiene and Public Health, and Ms. Lewis is evaluation specialist for the Community Hypertension Education Project and a doctoral student in the school's Department of Health Services Administration. Dr. Ward is chairperson of the Department of Health Education, University of South Carolina. Dr. Green is director of the Center for Health Promotion Research and Development and professor in the Department of Family Practice and Community Medicine, University of Texas Health Science Center at Houston. Mrs. Ruth B. Parry, research associate in the Community

Hypertension Education Project, provided technical assistance in the preparation of this manuscript. Dr. Donald Harting, Worcester County health officer, and Ms. Jane Apson, health educator, collaborated in the development of the rural community program. Dr. John Southard is principal investigator of the Maryland State High Blood Pressure Coordination Program. Dr. Aristide Apostolides and Dr. George Entwistle are principal investigators in the Maryland statewide household survey.

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Tearsheet requests to David M. Levine, MD, Department of Behavioral Sciences, Johns Hopkins School of Hygiene and Public Health, 615 North Wolfe St., Baltimore, Md. 21205.

tive committee, appointed by the State health department's project officer, includes the principal investigators for each subcontract and chairpersons of the standing committees. Those committees are organized along professional and functional lines. In addition, geographic dispersion of members was sought so that the scope of decisionmaking and activities would represent all areas of the State. The committees include those representing the professions of nursing, pharmacy, medicine, dentistry, and the functional areas consisting of public and patient education, worksite, church, and hospital.

The coordinating council developed a statewide implementation plan for blood pressure control to carry out two main goals:

1. To increase the proportion of controlled adult hypertensives by at least 10 percent in Maryland by 1982.
2. To reduce the number of persons in Maryland with diastolic blood pressure higher than 105 mm Hg by one-third by 1982.

As part of this statewide effort, the coordinating council recommended that targeted educational interventions be planned, implemented, and evaluated in two contrasting communities where the populations were at high risk of uncontrolled HBP and its cerebral, cardiac, and renal complications. Information gathered from these prototype communities was designed both to enhance the effect of improving HBP control in these two communities and to be shared with the statewide standing committees and the coordinating council in their development of guidelines for program implementation in their respective areas. The two communities recommended by the statewide executive committee were East Baltimore, an urban community of 71,000 persons, and Worcester County, a rural community of 30,000 on the Eastern Shore.

Methodology

Educational assessment: framework. The principles underlying the conceptualization and planning for these two demonstration projects have been based upon health education and organizational theories, and they have been used to create an overall framework for assessing individual, community, and organizational behaviors. Guided by these theories, planning has been based upon these three strategies:

1. defining the nature and extent of the problem at the individual, the organizational, and the community level;
2. identifying actual and potential resources to assist in coordinating the program; and

3. incorporating the community's goals and norms into the decisionmaking process.

A health education model (7) provided a useful framework for determining those factors which positively or negatively affect the behaviors that lead to health benefits. The framework used in this planning is called PRECEDE (an acronym for Predisposing, Reinforcing, and Enabling Causes in Educational Diagnosis and Evaluation). At the individual, community, and institutional levels, certain factors predispose, enable, and reinforce the initiation and continuation of behaviors that are conducive to blood pressure control. Some examples are given in the following list.

Predisposing factors—Items concerned with those patient characteristics which influence health behavior, for example, attitudes and beliefs.

Reinforcing factors—Items which identify those factors that strengthen positive health behavior or weaken negative behavior, for example, whether blood pressure is measured at every medical visit.

Enabling factors—Items which identify the availability and accessibility to health care, for example, sufficient time to discuss BP problems with the physician.

Educational assessment: data sources. Information collected for these projects was derived from a variety of sources: existing sources were used wherever possible. These included hypertension-related mortality rates by geographic area from the State vital statistics division (8), published reports and local surveys including educational approaches addressing community HBP control (9-11), and a three-community household survey in Baltimore City which provided sociodemographic and health care utilization data regarding the East Baltimore community (12).

Mortality data for diseases of the heart and vascular system are displayed in the table. When all rates were combined, Worcester County had the highest mortality rate, but Baltimore City was first for diseases of the heart for each of the 3 years preceding the education program.

Although both areas display similar hypertension-related mortality patterns, they differ considerably with respect to sociodemographic characteristics and health care use patterns. Compared with the State's population, the people of East Baltimore are somewhat younger, urban, and primarily black, and they live in a densely populated area; Worcester County residents are stabler, somewhat older, rural, and primarily white. Health care is predominantly institution based in the urban community (75 percent of the health care is provided

ACHIEVEMENTS AND CHALLENGES IN HYPERTENSION CONTROL

Diseases of the heart and vascular system for Baltimore City, Worcester County, and State of Maryland, 1974-76 deaths combined (rates per 100,000)

Cause of death	Baltimore City	Worcester County	Maryland
Diseases of the heart	444.43	430.18	305.99
Cerebrovascular disease	74.19	131.05	60.24
Arteriosclerosis	10.88	9.91	11.22
Hypertension	3.43	3.73	2.83
Other diseases of the arterioles and capillaries	17.03	9.92	10.96
All rates combined	576.84	584.75	391.24

SOURCE: Reference 8.

by the following institutions: a large teaching hospital, a community hospital, a community health care center, a health maintenance organization, and an outpatient, community-based, extended-care facility of the teaching hospital); but private practitioners or ambulatory care medical centers provide most of the medical services in the rural community.

The available information was useful first in defining the high-risk communities and then in providing the basis for an assessment of the health care problems related to high blood pressure. New information was obtained from a statewide household survey conducted by the Department of Social and Preventive Medicine of the University of Maryland School of Medicine in 1978-79 (13). This survey was designed to provide baseline data for program planning and evaluation. A followup survey is scheduled for 1982; it will assess changes in BP status and health care behaviors.

The sampling design in the 1978-79 survey was an equal probability sample of all Marylanders who resided in households and were 18 years of age or older. A total of 6,425 persons comprised the sample. No differences were noted between those in the sample and the State population with respect to any major socio-demographic variable (age, race, and sex). The data obtained from this survey consisted of limited medical histories, public and patient knowledge about HBP, attitudes and beliefs about HBP, relevant aspects of the provider-patient interaction, and availability and accessibility of health care. Blood pressure measurements were taken for each person interviewed (three were taken 1 minute apart, and the average of the last two measurements was used) allowing the computation of rates of awareness, treatment, and control of HBP, and extrapolation to the State population as a whole.

Data from the statewide household survey were helpful in establishing educational assessments for the planning of educational strategies in the two communities.

Because of the small numbers of persons interviewed in each area, however, additional data were gathered and an ongoing educational assessment process was initiated. Consistent with the statewide goal, local resources (such as trained high school students in the urban community and senior citizen groups in the rural community) were coordinated to gather some of these data.

Targeted telephone surveys, employing an age-sex quota sampling technique, were conducted. More than 400 residents in each community were interviewed to elicit information similar to that obtained in the statewide survey, without, of course, the opportunity to measure blood pressure.

Other sources of local data were hospitals' and community health centers' medical records. Reviews of random samples of records yielded baseline information on blood pressure control and appointment-keeping behavior. These data were used for planning; they will also be used for the final evaluation of these two projects.

Additional information was obtained from targeted interviews with health care providers, community leaders, and residents. The inclusion of these groups in the planning process facilitated community-provider linkages and the subsequent development of relevant, coordinated programs for HBP control. A task force in East Baltimore and an advisory counsel in Worcester County were formed to assure communication and orderly planning.

The data sources used in these two projects are shown in the list.

Data Sources and Information They Provided for the Educational Interventions Project

Existing Sources

State Vital Statistics Division--cardiovascular mortality
Rudd, et al. reference 4 and Levine, et al. reference 11--compliance, appointment-keeping behavior, effectiveness of health education interventions
German, et al. reference 12--availability, utilization of health care resources

New Sources

Statewide household survey--prevalence, awareness, treatment, and control of HBP, knowledge, attitude, beliefs, and behavioral correlates of HBP
Targeted telephone survey--reported HBP prevalence, knowledge, beliefs, and practices related to HBP
Reviews of provider medical records--appointment keeping behavior, BP control rates of diagnosed hypertensive patients

Findings

The PRECEDE planning model was used to analyze the items noted in the list that were correlated with variation in rates of awareness, being under care, appointment keeping, or BP control. Findings are presented in relation to the following three types of factors as noted previously.

Predisposing factors:

- understanding the asymptomatic nature of HBP,
- understanding adherence to the medical regimen.

Reinforcing factors:

- whether blood pressure is measured at every medical visit,
- whether the patient was told the exact blood pressure measurement and what the measurement meant,
- whether the provider ever made BP information available,
- whether the physician was too busy to spend time with the patient, and
- whether the provider ever asked the patient if there were problems with the blood pressure medication.

Enabling factors:

- the site where the blood pressure is usually measured—private physician's office or other,
- whether an appointment is necessary for a HBP visit and the last time that the blood pressure was measured.

Analysis of the data identified the following similar problems in the two communities.

1. Men under 50 years are least likely to be aware of their elevated blood pressure, be in care, and achieve blood pressure control.

2. Of hypertensive patients under care, about 40 percent demonstrate inadequate compliance with their therapeutic regimen. Previous studies indicate this problem to be related to inadequate patient-provider communication (such as confusion about specific regimens, taking medication based on how they feel, and lack of family and social support).

3. A large proportion of those surveyed incorrectly believe that people who have HBP often experience specific symptoms. The percentages of those surveyed in the two communities who expressed incorrect beliefs were as follows:

Symptom	East Baltimore	Worcester County
Headache	88	69
Dizziness	94	79
Nervousness or tension ...	86	73

Among the hypertensive population, those who believed in the symptomatology of HBP were less likely to see a physician about their HBP in the last 6 months

($X^2 = 5.9$, $P < .01$) and less likely to have their BP under control (pressures above 140 mm Hg systolic and/or above 90 mm Hg diastolic; $X^2 = 12.5$, $P < .01$).

4. The absence of internal coordination within institutions and community health centers results in a lack of standardized referral guidelines or systematic follow-up for persons with an elevated pressure. This lack of coordination is most pronounced in the urban community where an outpatient clinic or an emergency department focuses on acute illness or experiences considerable rotation of staff.

5. The absence of community-based organizational structures in each area to coordinate existing resources for HBP control.

6. The following factors were significantly correlated with hypertensive patients having seen their physician about their HBP in the last 6 months. These include those who were told their exact BP measurement and what it meant ($X^2 = 66.7$, $P < .001$); those who reported that their provider made HBP information available ($X^2 = 41.5$, $P < .001$); and those who reported that their physician was not too busy to spend time with them ($X^2 = 13.9$, $P < .001$).

In addition, there was a significant dropout problem in the urban community among two groups of patients. The first group consisted of those who had an initial blood pressure elevation and did not complete verification measurements. These people are usually young men seen in emergency rooms and outpatient departments where followup is absent. The second group were diagnosed hypertensives who, despite the provider institutions and followup attempts, did not continue in care. Statewide data would indicate that this is related to patients misbelieving that they no longer need to be in care or are cured. In the rural community, difficulty in achieving blood pressure control was more widespread than the problem of continuity of care.

Implementation in the urban community. Analyses of the community and provider data indicated the need for community outreach and followup. This outreach was intended to extend and enhance current provider efforts to increase the likelihood of returning dropouts to continuing care, as well as increasing the rates of those completing diagnosis and care after the discovery of an initial elevated blood pressure. The planning and implementation of these efforts has been carried out by the East Baltimore Community HBP Control Task Force consisting of representatives from the five major health care institutions, community leaders, and residents. Initial exploration indicated that the city health department was supportive of such a program, but the

department did not have the capacity to coordinate it. The task force's chairperson is a community leader who is also the assistant director of a decentralized city agency which defines and addresses community problems. Regular task force meetings over the past 3 years have provided an opportunity for the dissemination of the diagnostic findings, such as those factors related to increasing patients' adherence to the medical regimen, as well as findings from the program's activities which have resulted in modifications of the ongoing effort.

The East Baltimore Community HBP Control Task Force has developed protocols for followup and outreach, as well as guidelines and educational approaches tailored to patients at the various stages in identification and care. The approaches designed for this project build upon existing community resources and strengths in order to be more feasible, affordable, and likely to be continued. Because of these criteria and of community interest in HBP, persons already employed in city service agencies and schools and providing human services were further trained to measure blood pressures and provide educational counseling and outreach for persons referred to them from provider institutions. These persons function as "extenders of care" for the providers. Those referred are people who have not completed the initial screening and diagnosis process, patients who have dropped out of care, and those who would benefit from blood pressure monitoring and reinforcement; 10 female community health workers provide followup and outreach. Preliminary analysis of the data indicates that approximately 40 percent of those who have dropped out of care and had not previously returned to care, despite health care providers' efforts, have now returned to care.

In addition, targeted activities have been directed toward men aged 18 to 50 years. The approach has been to provide opportunities for these men to receive a free BP check and followup at worksites, recreation centers, or other places where they are likely to congregate and to assist the health care system to coordinate systematic referral and followup methods. Preliminary analysis indicates that this group is reachable; however, followup is often limited by their lack of telephones. Of those contacted for followup by telephone, more than 40 percent have completed the referral process. In addition, the provider institutions have improved their own systematic referral and followup mechanisms for persons with elevated blood pressures.

Implementation in the rural community. Because of their different educational diagnoses, the implementation of the BP control program in the rural community

has varied from that of the urban community. Program planning and implementation has been carried out by the local health department under the direction of the county health officer and an advisory council with members from the health department, representatives from agencies, and consumers. Among the agencies are the Rural Management of the Aged in the Community (MAC) Senior Program, volunteer fire departments, pharmacies, the department of social services, two ambulatory health care centers, the school system, the American Heart Association, and the local nursing school.

The health department has set up a coordinated system linking existing community sites (fire departments, MAC centers, and churches) which offer BP screening, followup, and monitoring. Statewide referral guidelines are followed by personnel at each of these sites. A worksite program, initiated by a nurse practitioner, has been especially effective in reaching target groups.

Educational efforts have been targeted to providers to increase physician awareness of the problem of inadequate BP control, despite the patient's being under care. In particular, the issues of blood pressure goal, the importance of provider-patient interaction, and the patient's compliance with medication taking and appointment keeping have been emphasized. Preliminary analyses indicate providers' acceptance and the feasibility of this approach. In addition, county pharmacies have implemented a prescription reminder system to increase compliance. A coordinated public information campaign via local media and radio broadcasts has reinforced compliance messages and informed the public of the availability of free BP measurements.

Evaluation planning. Evaluation was built into the conceptual framework and the implementation of the demonstration projects. This continuing evaluation process has influenced both the development and modifications of the approaches for HBP control. In addition, knowledge derived from the community interventions is shared with members on the State coordinating council for use in statewide program planning. The evaluation of these projects incorporates analysis of the processes (for example, the activities of the task force and advisory committee, the development of consensus on protocols, coordination activities, training of community health workers); impact (for example, the numbers of persons brought back into care); and outcomes (proportion of individuals achieving adequate blood pressure control).

The followup statewide household survey in Maryland will assess changes in the levels of awareness, treat-

ment, and control of high blood pressure; in patient knowledge, attitudes, and beliefs, and in patient, physician, and institutional practices. A second review of the health care institutions and of providers' medical records will provide information on appointment-keeping behavior and blood pressure control in the two communities.

Conclusion

In summary, we have described an approach to planning an educational interventions project that links the health care providers and the community, thereby allowing the programs to be carried out in consultation with the target populations. Based upon a multilevel diagnosis of the needs of individual persons, of the community, and of health care institutions, educational strategies were designed and implemented to influence the long-term care and management of uncontrolled HBP. Data-based planning has led to targeted educational interventions which maximize efforts by the community and health care institutions to develop a coordinated approach for the management and control of HBP in two communities with high-risk populations.

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SYNOPSIS

LEVINE, DAVID M. (Johns Hopkins School of Hygiene and Public Health), MORISKY, DONALD E., BONE, LEE R., LEWIS, CAROL, WARD, WILLIAM B., and GREEN, LAWRENCE W.: *Data-based planning for educational interventions through hypertension control programs for urban and rural populations in Maryland. Public Health Reports*, Vol. 97, March-April 1982, pp. 107-112.

As part of a statewide effort to coordinate existing resources for high blood pressure (HPB) control, a public health HPB control program was planned and implemented in two high-risk communities in Maryland. The selection of the two communities

was based on epidemiologic data. The planning of the educational intervention program in these communities (urban and rural) was guided by organizational theory and health education principles. The framework for development, implementation, and evaluation of the program utilizes an educational assessment model which identified factors that predispose, reinforce, and enable individual persons to practice positive health behavior.

Multiple data sources were used in assessing the extent of the problem and relevant approaches in the development of the coordinated HPB control program. These include statewide vital statistics and a random

statewide household survey to assess the prevalence rates of awareness, treatment, and control of HPB. To supplement these data, telephone surveys were carried out in the two communities to assess knowledge, beliefs, and practices related to HPB control. Medical record reviews provided baseline information on appointment keeping behavior and BP correlates of hypertensive patients.

The planning and implementation of the program was carried out under the direction of representatives of the health care systems, community leaders, and residents, and representatives of communitywide organizations involved in HPB control.

Pilot Study of Health Professionals' Awareness and Opinions of the Hypertension Information in the Mass Media They Use

GRAHAM W. WARD, MPH
WILLIAM MORRISON, MS
GEORGE SCHREIBER, ScD

THE NATIONAL HEART, LUNG, AND BLOOD INSTITUTE (NHLBI), currently invests about \$350,000 annually to produce and distribute mass media materials about hypertension control. These materials have been primarily aimed at communicating knowledge and skills about hypertension control to the general public and to persons aware that they have high blood

pressure (HBP). The National High Blood Pressure Education Program (NHBPEP), begun in 1972, is a cooperative effort among governmental and private groups to reduce death and illness associated with hypertension through education of health professionals, hypertensive patients, and the public. This program is coordinated by the Institute.

During routine assessment of program strategies to increase cost-effectiveness, NHLBI staff noted that health professionals, as well as the general public and patients, are exposed to and may be influenced by mass media. Mass media clearly impact the actions of the general public, and mass media materials might be designed that would have improved impact upon the practices of health professionals.

A review of the literature dis-

closed no studies on the impact of general content of the mass media on health professionals. Consequently, NHLBI staff mounted a pilot study in a single community to assess mass media use and the recall and opinions among health professionals of hypertension content in these media. If their recall or opinions were low, the likelihood of mass media impact would be presumed slight. If recall or opinions were high, this would indicate probable impact on the professionals requiring further, refined assessment.

Methods

The study was conducted in two phases during January and April 1981 among health professionals in Richmond, Va. Two random samples of practicing physicians, nurses, and pharmacists were drawn from licensing body rosters, each sample

Mr. Ward is chief, and Mr. Morrison is coordinator for mass media, of the Health Education Branch, National Heart, Lung, and Blood Institute. Dr. Schreiber was, during the study, the Branch's coordinator for evaluation and for nutrition education. He is now assistant to the director of the Division of Resources, Centers, and Community Activities, National Cancer Institute.

Teasheet requests to Graham W. Ward, MPH, Chief, Health Education Branch, NHLBI, Rm. 4A-24, Bldg. 31, National Institutes of Health, Bethesda, Md. 20205.

Table 1. Response rates by profession

Item	Physicians		Nurses		Pharmacists		Total, both phases
	Phase I	Phase II	Phase I	Phase II	Phase I	Phase II	
Final sample	116	117	62	69	59	69	479
Completed questionnaire	77	77	55	54	46	53	362
Response rate (percent)	66	66	89	78	78	82	76

ultimately consisting of approximately 75 physicians, 50 nurses, and 50 pharmacists in active practice. The samples were stratified by ZIP code to assure representative geographic distribution.

To assure that the media contained hypertension content which could subsequently be recalled, NHLBI staff, assisted by Virginia State High Blood Pressure Control Program staff, arranged placement of newspaper news items and letters to the editor, television public service announcements (PSAs), a one-half hour television special program, and PSA film trailers in movie houses. Because there were no local magazines with wide circulation, it was necessary to rely on the contents of national magazines.

The media placements and a first survey were conducted during January 1981. Following a normal media period (in terms of hypertension content), the second, non-duplicated survey was conducted during April. This interval served as a means of assessing decay of recall.

Prior to the survey, letters were sent from the appropriate local professional society explaining the purpose and sponsorship of the project. Trained interviewers made appointments by telephone, then called in person upon the sample members. Those who refused were sent a letter by NHLBI further explaining the study and requesting participation. The interview con-

sisted of a 15-20 minute questionnaire addressing media use, unaided recall of HBP content, aided recall, and professional opinion regarding content accuracy. Sample development, field data collection, and initial data analysis were performed through a contract with a survey group, Damans and Associates of Rockville, Md. Field data were analyzed using a standard SPSS package. Aided recall data will be reported later in a separate paper.

Results

From a total sample of 479 practicing professionals drawn from licensing rosters, interviews were completed with 362, for a response rate of 75 percent. By profession, approximately two-thirds of the physicians and 80 percent of nurses and pharmacists in each panel responded (table 1). There was little difference between the responses in the Phase I and Phase II surveys; therefore, data from the two panels were pooled.

Media use. The range of general mass media used by health pro-

fessionals was broad. Newspapers, magazines, radio, and television were used nearly universally; lay meetings and movie attendance was reported about half as often (table 2).

By profession, physicians reported the highest use of print media. Eighty-four percent read newspapers every day compared with 66 percent of pharmacists and 44 percent of nurses. Similarly, 46 percent of physicians compared with 28 percent of pharmacists and 22 percent of nurses read between 5 and 10 magazines each month.

Nurses and pharmacists reported more TV and radio use than physicians. About one-fourth of nurses and pharmacists reported 3 to 4 hours of daily TV watching; fewer than 10 percent of physicians watch this much. About double the proportion of nurses (16 percent) and pharmacists (13 percent) listened to 4 to 6 hours of radio daily as did physicians (6 percent).

More physicians (39 percent) attended community meetings each month than did nurses (29 percent) and pharmacists (26 per-

Table 2. Media use by health professionals

Media	Number	Percent
Newspapers	355	98
Magazines	346	96
Radio	330	91
Television	346	96
Lay meetings	203	56
Movies	231	64

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Table 3. Percentage of professionals who recalled high blood pressure content in the media they used

Group	Television	Newspapers	Magazines	Radio	Movies
All professionals	82	54	49	37	7
Physicians	79	58	47	34	6
Nurses	97	48	56	37	9
Pharmacists	95	56	43	40	9

cent). The rate of movie attendance was low and sporadic among all professions; many respondents went so infrequently or irregularly that they could not cite a monthly attendance rate.

Media recall. Those professionals reporting use of a given medium were then asked if they recalled items about hypertension in that medium (table 3). Fifty-four percent of the 355 respondents reporting that they read newspapers had unaided recall of high blood pressure items. By profession, 58 percent of physicians, 56 percent of pharmacists, and 48 percent of nurses recalled some newspaper items. There was wide variation in the type of message recalled. News items, public service advertisements, and health columns were most often recalled in that descending order of frequency. Editorials and letters to the editor had extremely low levels of recall among all professionals.

Recall of content on HBP in general magazines was reported by 49 percent of all professionals (nurses, 56 percent; physicians, 47

percent; and pharmacists, 43 percent). As with newspapers, the type of magazine content that was recalled varied. Physicians (52 percent) and pharmacists (55 percent) mostly remembered news items, Nurses most recalled public service announcements (60 percent) and feature stories (50 percent).

Television had the highest recall rate of all media among all professionals; 82 percent overall recalled seeing any HBP content on TV. Of that group, more than 90 percent of all professions recalled PSAs. Twenty-two percent of physicians and 25 percent of nurses recalled news items. Appearances of health professionals were recalled by 37 percent of pharmacists.

Radio fared least well; HBP content recall in this medium was only 37 percent among all professionals who listened to radio. PSAs were most remembered (97 percent of those who recalled radio content). News items and talk show content were remembered by only 15 percent or fewer.

One medium—posters, signs, and billboards—although not examined for usage rates, had high recall.

Of those mentioning such items (65 percent of all professionals), posters were recalled by 84 percent and signs and billboards each by 34 percent.

Rating of media content accuracy.

In this survey the finding most surprising to the investigators was the high rating of content accuracy attributed by all health professionals to all the media. Respondents were asked to categorize the hypertension information disseminated by each medium they used as very accurate, somewhat accurate, or not accurate (table 4). Television was rated very accurate as to content by 78 percent of professionals who watched it, radio by 72 percent, magazines by 64 percent, and newspapers by 55 percent. Newspapers were the only medium receiving ratings of not accurate; 2 percent of newspaper-reading respondents gave this assessment.

Conclusions

Although the results of this single-community pilot test must be viewed as tentative, health professionals do not seem to differ greatly from the general public in their use of mass media. Their recall rates and quite high ratings of content accuracy suggest that mass media do serve as a conduit for health information, at least in a news sense, to this segment of the population. Health professionals differentially use the media (physicians leaning somewhat more toward print, nurses and pharmacists toward electronic media), thus suggesting that message targeting is possible. Education and communication practitioners should further examine use of general mass media in professional education efforts, especially for the purposes of increasing health professional awareness of new scientific information which they can further explore in the technical literature.

Table 4. Media users' accuracy rating of high blood pressure information (percentages)

Media	Very accurate	Somewhat accurate	Not accurate
Television	78	22	0
Radio	72	28	0
Magazines	64	36	0
Newspapers	55	43	2

A Blood Pressure Survey in Nuevo Laredo, Mexico

ANGEL GONZALEZ CAAMANO, MD
RICHARD COOPER, MD
LUCILA CEDRES, MA
LUIS ALCOCER DIAZ BARRIERO, MD
RAFAEL CHAVEZ DOMINQUEZ, MD

THE ENORMOUS HEALTH HAZARD associated with elevated blood pressure has come to be appreciated by health authorities all over the world. As a consequence, large-scale screening programs have been organized to expand our knowledge of the epidemiology of hypertension and to identify people who are unaware of their illness (1-5). An additional important result of the recent mass campaign to measure

blood pressure has been an opportunity to compare the pattern of hypertension in a wide variety of countries. We report here on a community survey in Nuevo Laredo, Mexico. This report provides a point of reference for the study of cardiovascular diseases in the Mexican-American population of the United States.

Methods

The survey in Nuevo Laredo was undertaken by the Mexican Council Against Arterial Hypertension in cooperation with the Mexican Society for the Study of Arterial Hypertension and the Mexican Society of Cardiology. In 1976, 6,351 persons between the ages of 30 and 69

were screened in the municipality of Nuevo Laredo, Tamaulipas, Mexico. Target groups were defined based on the relative distribution of specified occupational class categories in the general population of the city. This distribution is approximate, since a concurrent enumeration of the entire population was not available. People were then recruited from the areas of their residence and workplace so as to provide a representative sampling of each of the target groups. The occupational class categories were defined as shown in the box. Pregnant women and persons currently suffering from a serious medical illness were excluded from the survey. The fieldwork was carried out by health professionals

Dr. Caamano is a professor, Faculty of Medicine, National Autonomous University of Mexico, and secretary of the Mexican Council Against Hypertension. Dr. Barriero is chief, Department of Hemodynamics, Cardiology Unit, General Hospital of Mexico City, and member of the Mexican Council Against Hypertension. Dr. Dominguez is on the faculty of the Mexican National Institute of Cardiology and a member of the Mexican Council Against Hypertension. Ms. Cedres is a research fellow of the Consejo Nacional de Investigaciones Cientificas y Technologicas Venezuela, who is working at the Department of Community Health, Northwestern University, Chicago, Ill.

Teasheet requests to Richard Cooper, MD, Attending Physician, Department of Medicine, Cook County Hospital, 1825 W. Harrison St., Chicago, Ill. 60612.

Occupational class categories

Group 1
Household worker
Fisherman
Farm laborer
Peasant

Group 2
Craftsman
Foreman
Clerical worker
Operative worker

Group 3
Professional
Technical worker
Executive

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from the public health department of Nueva Laredo, assisted by volunteer medical students from the National University of Mexico. The study personnel, who were trained in the use of a standardized procedure, recorded all data on precoded forms.

Demographic data were collected from the respondents on their age, sex, marital status, level of education, occupation, and previous knowledge of hypertension. A single blood pressure measurement was taken with a standard mercury sphygmomanometer while the person was seated. All technicians measuring blood pressure (BP) were certified in the procedure by the Mexican Council Against Arterial Hypertension according to the recommendations of the World Health Organization. Fifth phase Korotkoff sounds were used to estimate diastolic pressure. BP was measured between the hours of 9 and 12 am at the person's residence or worksite. Data were coded, key-punched, and compiled in tables by the Mexican Society of Cardiology.

Results

The majority of the population were in their thirties; only about 20 percent had an educational level beyond primary school (table 1). As might be expected, the majority were employed in manual or clerical occupations. As can be seen in table 2, systolic BP was slightly lower in women than in men in the younger age groups, but was higher in the group over age 50. Diastolic BP for males rose little over this age span, although a consistent increase was apparent among females; only in the 30-39 year age group was a sex difference apparent; in this age group, the BP of men exceeded that of women by 4.5 mm Hg.

The prevalence rates for hypertension—based on two definitions—

Table 1. Distribution of study population by sex, occupation, education, and age group, Nuevo Laredo blood pressure survey

Classification	Age groups				All ages 30-69 years
	30-39 years	40-49 years	50-59 years	60-69 years	
Sex:					
Male	1,239	798	585	348	2,970
Female	1,378	971	626	406	3,381
Total	2,617	1,769	1,211	754	6,351
Occupational group:					
No. 1	1,255	902	611	427	3,195
No. 2	1,190	781	529	295	2,795
No. 3	165	83	53	29	330
Total	2,610	1,766	1,193	751	6,320
Education:					
Illiterate	228	246	210	218	902
Primary	1,705	1,166	809	457	4,137
Secondary	158	97	69	22	346
Preparatory	59	38	18	11	126
Professional	399	193	79	36	707
Total	2,549	1,740	1,185	744	6,218

Table 2. Systolic and diastolic blood pressure of study population by age group and sex, Nuevo Laredo blood pressure survey

Age group (years)	Male		Female		Both sexes	
	Mean	SD	Mean	SD	Mean	SD
Systolic blood pressure						
30-39	134.9	20.6	128.0	19.2	131.3	20.2
40-49	137.6	23.5	135.1	23.9	136.2	23.8
50-59	142.7	26.0	145.7	29.8	144.2	28.1
60-69	149.8	31.9	156.8	34.3	153.6	33.4
All ages 30-69	138.9	24.5	136.8	26.7	137.8	25.8
Diastolic blood pressure						
30-39	85.1	14.4	80.6	13.5	82.7	14.1
40-49	86.3	16.1	83.4	14.4	84.7	15.2
50-59	86.6	14.1	85.7	15.8	86.1	15.0
60-69	86.6	6.0	87.8	18.0	87.3	17.1
All ages 30-69	85.9	15.0	83.2	15.0	84.5	15.1

NOTE: SD = standard deviation.

are presented by sex and occupational group at each age level in tables 3 and 4. As would be anticipated from table 2, the percentages of hypertensives among men and women were similar overall,

with higher rates among men 30-39 years old and among women in the two oldest age groups. Among occupational groups, a pattern of an increasing prevalence of hypertension is apparent as one moves from

Table 3. Number and percent of hypertensives with diastolic blood pressure ≥ 90 , by demographic characteristics, Nuevo Laredo blood pressure survey

Classification	Age groups									
	30-39 years		40-49 years		50-59 years		60-69 years		All ages 30-69 years	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Sex:										
Male	378	30.5	260	32.6	194	33.2	124	35.2	956	32.2
Female	269	19.5	276	28.2	206	32.9	151	37.2	902	26.6
Total	647	24.7	536	30.2	400	33.0	275	36.5	1,858	29.2
Occupational group:										
No. 1	254	20.2	269	29.8	207	33.3	156	36.6	886	27.7
No. 2	336	28.2	231	29.6	168	31.8	106	35.9	841	30.1
No. 3	56	33.9	33	38.8	24	45.3	11	37.9	124	37.4
Total	646	24.8	533	30.2	399	33.2	273	36.4	1,851	29.2
Education:										
Illiterate	52	22.8	63	25.6	71	33.6	76	34.9	262	29.0
Primary	422	24.8	367	31.5	265	32.8	173	37.9	1,227	29.7
Secondary	45	35.2	30	30.9	18	26.1	5	22.7	98	31.0
Preparatory	14	23.7	12	31.6	8	44.4	3	27.3	37	29.4
Professional	107	26.8	57	29.5	32	40.5	11	30.6	207	29.3
Total	640	25.4	529	30.4	394	33.2	268	36.0	1,831	29.6

Table 4. Number and percent of hypertensives with systolic blood pressure ≥ 160 mm Hg, by demographic characteristics and age group, Nuevo Laredo blood pressure survey

Classification	Age groups									
	30-39 years		40-49 years		50-59 years		60-69 years		All ages 30-69 years	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Sex:										
Male	86	6.9	73	9.1	92	15.7	85	24.4	336	11.3
Female	61	4.4	93	9.5	125	19.9	138	33.9	417	12.3
Total	147	5.6	166	9.3	217	17.9	223	29.5	753	11.8
Occupational group:										
No. 1	64	5.1	99	10.9	136	22.2	146	34.1	445	13.9
No. 2	69	5.8	64	8.2	73	13.8	67	22.7	273	9.7
No. 3	13	7.9	13	15.6	7	13.2	8	27.5	41	12.4
Total	146	6.0	176	10.0	216	18.1	221	29.4	759	12.0
Education:										
Illiterate	22	9.6	19	7.7	49	23.3	68	31.1	158	17.5
Primary	102	5.9	128	10.9	141	17.4	142	31.0	513	12.4
Secondary	7	4.4	3	3.0	6	8.7	2	9.0	18	5.2
Preparatory	2	3.3	2	5.2	7	38.8	3	27.2	14	11.1
Professional	12	3.0	20	10.3	12	15.1	6	16.6	50	7.0
Total	145	5.6	172	9.8	215	18.1	221	29.7	753	12.1

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Table 5. Systolic and diastolic blood pressure of study population by age and occupational group. Nuevo Laredo blood pressure survey

Age group (years)	Occupational group No. 1		Occupational group No. 2		Occupational group No. 3		Occupational group No. 4	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Systolic blood pressure								
30-39	129.2	20.0	132.65	19.6	137.29	22.8	131.3	20.2
40-49	137.1	25.7	134.88	22.5	145.37	28.7	136.5	24.6
50-59	147.6	29.7	140.97	25.4	145.11	26.5	144.6	27.9
60-69	157.7	34.6	147.37	30.8	156.74	32.8	153.6	33.5
All ages 30-69	138.6	27.8	136.40	23.5	142.29	26.6	137.9	25.9
Diastolic blood pressure								
30-39	80.6	13.7	84.3	13.7	86.96	17.8	82.7	14.1
40-49	83.8	14.2	85.3	15.5	89.15	21.3	84.7	15.3
50-59	85.7	15.4	86.2	13.6	90.26	20.1	86.1	15.0
60-69	87.3	18.0	87.0	15.7	86.57	12.4	87.2	16.9
All ages 30-69	83.4	15.0	85.2	14.7	88.01	18.8	84.5	15.1

NOTE: SD = standard deviation.

the manual to professional and executive categories. This trend is not apparent for hypertension defined as systolic BP over 160 mm Hg. In both instances, it should be noted, the estimates in occupational group 3 are based on small numbers. The potential relationships between occupation and BP are shown in table 5, which presents the mean values for systolic and diastolic BP by occupational group. For systolic pressure, a trend toward higher values with increasing occupational status is apparent for the two younger groups; for diastolic pressure, this trend is apparent until age 60. The differences between occupational groups 2 and 3 are statistically significant for systolic pressure; for diastolic pressure, significant differences were found between groups 1 and 2 and between groups 2 and 3 (based on the Scheffé method of testing for multiple comparisons ($P < 0.05$)).

Discussion

From this initial community survey, it is apparent that untreated hypertension is a significant public health

problem in Nuevo Laredo. With the criterion of a diastolic pressure over 90 mm Hg, a prevalence rate for hypertension of about 30 percent was found in this population. In members of the U.S. population aged 30-69 years screened in the national collaborative Hypertension Detection and Followup Program, 25.3 percent had a diastolic pressure over 90 mm Hg (5). With the criterion of definite hypertension (systolic BP greater than 160 mm Hg), the prevalence rate in Nuevo Laredo was approximately 12 percent for this age range. Unfortunately, since age groups are defined differently in this study than in the U.S. National Health and Nutrition Examination Survey data of 1971-74 (NHANES I), age-specific comparisons are difficult (6). By the same token, a mean of three readings was used in NHANES, and persons with a diastolic BP over 95 were included; also, the age distributions were not identical in the two surveys. Despite these differences between the surveys, the prevalence rates for hypertension in Nuevo Laredo are comparable to

the rates for U.S. whites and considerably lower than those for U.S. blacks (6). Mean blood pressure was in the range that is commonly reported in modern community surveys.

Perhaps one of the most important observations based on the new generation of BP studies from societies all over the world is that hypertension prevalence rates are similar. Thus, when World Health Organization criteria for the entire adult population are used, prevalence rates in the range of 10 percent are generally reported, with the notable exception of the black population in the United States (1-4). Although a somewhat narrower age range was studied in this survey, the results are generally consistent with that trend. Previous reports from Mexico have given somewhat lower prevalence rates, but the samples studied were not representative of the general population (7). The morbid sequelae of hypertension, particularly strokes, are common in Mexico and further attest to the widespread prevalence of untreated hypertension (8).

Hypertension surveys from other areas in Latin America demonstrate that the disease is common, at least in urbanized populations (9,10). The enormous diversity of social and ethnic background in Latin America, however, necessitates clear demographic distinctions. A number of rural population groups are known to have remarkably little hypertension (11-13). Also, in at least one survey of blacks in Latin America, BP was not exceptionally high (14). Within the United States, it would appear that the Hispanic (primarily Mexican-American) population has rates of hypertension between those of whites and blacks (15-17). It is likely that environmental factors, for example, social conditions, are the primary determinant. Differences in hypertension rates under different social conditions have been observed in comparisons between blacks in the United States and in Africa (18).

Our study has two important shortcomings. First, body weight was not recorded. Since body weight is such an important determinant of BP, our data can only be presented as descriptive; they provide little insight into causative relationships. Second, data on hypertension treatment were not recorded. The level of control of hypertension in the United States of roughly 50 percent indicates that survey data will be significantly influenced by treatment patterns. The current degree of hypertension control in Nuevo Laredo is unknown. In a recent study from Laredo, Texas, immediately across the border, a control rate of 37 percent was found for men and 77 percent for women in 1979 (15). It must be assumed, therefore, that the figure presented here underestimate the hypertension rates.

Even given the limitations just described, the association between

the gradient of hypertension and occupational class is interesting. In societies like that of the United States, a negative association between BP and occupational class has usually been reported (19,20). Poor people tend to be fatter in industrialized societies, and this tendency also was found among the Mexican-American population in the Laredo survey (15). In general, also, people with higher incomes tend to get better medical care. Both these factors would have the effect of raising the relative prevalence rates of hypertension among the workers and farmers in the lower occupational categories, as we have reported here. The significantly higher BP levels in the professional and managerial group despite these confounding factors supports the finding of a positive association of BP with occupational class. It is interesting to speculate that the presence in a community of many people who have recently left villages and farms and have not yet been thoroughly integrated into the industrial economy may account for a continued lower prevalence of hypertension. What we observed in Nuevo Laredo may be an earlier stage in the evolution of mass disease than that found in the U.S. population. If so, as these persons from villages and farms enter urban occupations and adopt a modern lifestyle, the risk factors that account for increased hypertension among the poor and minority populations of industrialized populations may reverse the relationship between occupational class and BP that we observed (21).

Although a number of studies are currently underway or have been reported in abstract form, little information is available from cardiovascular studies of the second largest minority population in the United States, persons of Hispanic origin (22-24). This report pro-

vides information on the Mexican population living in close proximity to the U.S. border. It will be interesting to see how social conditions mold the pattern of cardiovascular diseases as the relationship between the two countries develops and their populations intermingle. The process has already been observed in respect to cancer (24). Furthermore, this relationship provides an excellent opportunity for cooperative research between Mexico and the United States based on the natural experiment of immigration. The results reported here suggest that a survey in which rural and urban Mexican and Mexican-American populations were compared by similar methods might provide clues that would help elucidate the role that social etiology plays in hypertension.

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SYNOPSIS

CAAMANO, ANGEL GONZALEZ (National Autonomous University of Mexico), COOPER, RICHARD, CEDRES, LUCILA, BARRIERO, LUIS ALCOCER DIAZ, and DOMINQUEZ, RAFAEL CHAVEZ: A blood pressure survey in Nuevo Laredo, Mexico. *Public Health Reports*, Vol. 97, March-April 1982, pp. 116-121.

A blood pressure survey was carried out in 1976 in the city of Nuevo Laredo, Mexico, which involved 6,351 persons 30-69 years old. The study sample was recruited so as to represent an approximation of the overall distribution of occupational classes in the urban population. Members of the population sample were relatively young and of low educational attainment. To the extent that comparisons

among surveys are feasible, mean blood pressure levels and hypertension rates were roughly comparable to those found in the white population of the United States. Although no firm conclusions can be drawn from the survey, a trend toward somewhat higher hypertension rates within the professional and managerial class was observed in some age groups in Laredo.

The Employee High Blood Pressure Program of the National Institutes of Health

BARBARA P. WASSERMAN, MD

THE OCCUPATIONAL MEDICAL SERVICE (OMS) of the National Institutes of Health provides services for more than 13,000 employees of the Institutes. The overall responsibility for the individual person's care, however, remains with the private physician. The OMS services include emergency care at the worksite, assistance in obtaining medical care in the community, administration of specific medication prescribed by the private physician, periodic health examinations for those whose work may entail a health risk, health education programs, counseling on personal medical problems, preventive medical services such as hearing and vision tests, and blood pressure checks.

Published epidemiologic and research data clearly show a positive correlation between adequate control of blood pressure and reduction in the incidence of complications involving the cardiac, renal, and cerebrovascular systems (1-4). Accordingly, the OMS staff has been strongly committed to a variety of efforts to detect high blood pressure and assist hypertensive employees to achieve adequate blood pressure control. The NIH Employee High Blood Pressure Program, which includes screening, followup, referral, and moni-

toring, is a free, convenient service for employees and their physicians.

In 1974, the National Heart, Lung, and Blood Institute (NHLBI) implemented a short-term blood pressure screening program for NIH employees at the Bethesda, Md., facility. About 11,000 or 80 percent of the target population were screened; 80 percent of those screened had normal and 20 percent had elevated blood pressures. (Normal was considered to be $< 140/90$ mm Hg in persons under age 40 and $< 160/95$ mm Hg in persons 40 years old and over.) Employees with initial blood pressure readings above normal were screened a second time before they were referred to their private physicians. Because of employee unions' concern about the privacy of medical records, no permanent records were kept by NHLBI during this pilot effort. However, the employees were given a written record at the time of the examination and advised to check with their private physicians.

During the next 2 years, the OMS provided high blood pressure screening and monitoring services for employees. Encouraged by the NHLBI program's efforts to control blood pressure at the worksite, the OMS undertook an employee program that set specific training standards for the OMS staff and addressed a broad range of health care activities for NIH employees.

Teasheet requests to Barbara P. Wasserman, MD, Assistant Medical Director, Occupational Medical Service, National Institutes of Health, Bldg. 31, Rm. B2B47, Bethesda, Md. 20205.

Methods

The program concept was developed by the Assistant Medical Director and a staff nurse of the OMS. Supplementary funding was requested for additional staff and supplies, and the proposal and budget were submitted to the Directors of the NIH and the Clinical Center for approval. The OMS staff invited nine NIH employees to serve on an advisory committee. These committee members, who were mainly responsible for task development in their particular specialties, were drawn from various functional areas and employee groups—personnel management, nurse training-education, space management, union membership, equal employment opportunity, publicity information, medical staff, and the National High Blood Pressure Education Program (NHBPEP). During 4 months in 1978, the committee members accomplished the following activities:

1. Reviewed and approved the program goals.
2. Formulated a work plan that included a task outline, assignment of responsibilities, and projected time frame. Specific accomplishments included:
 - an inservice education program plan that included lectures, movies, and demonstrations for the 10 nurses who were to work in the program,
 - an education and publicity program for NIH employees that included a desk-to-desk memorandum from the Director of NIH, periodic articles in various publications circulated to NIH employees, and publicity posters with a specially designed logo,
 - a publicity program for the non-NIH medical community to alert physicians to the program and solicit their cooperation in accepting referrals of hypertensive employees; county and State medical societies were notified by letter, and announcements were printed in State and local medical journals,
 - a plan to maximize supervisors' cooperation that included a memorandum of support from high-level NIH management and briefings by the Director of Personnel to management staff,
 - a strategy to encourage a high level of employee participation in the program; specific efforts included union representation on the advisory committee, talks to employee groups about the program, and a policy statement regarding voluntary recordkeeping and strict adherence to the confidentiality requirements of the Privacy Act,
 - a program protocol that included the steps to be followed for screening, followup, referral, monitoring, and education, as well as the specific forms and a recordkeeping system to be designed for the program,
 - a referral list of health care resources in the Wash-

ington, D.C., metropolitan area, including local health departments, private clinics, hospital clinics, and referral services operated by local medical societies.

- selection of literature on high blood pressure for distribution to employees,
- a pilot program to test various components of the program, and
- an evaluation plan to determine whether objectives had been met.

The formal program was initiated in May 1978 to coincide with National High Blood Pressure Month. Between May and November 1978, OMS staff carried out screening and referral activities in 27 worksite locations, including laboratories, offices, and health clinics. Three to 4 days before screening was scheduled at a particular site, the OMS distributed a memorandum desk to desk to remind employees of the program. On the day before the screening, posters were placed in conspicuous locations and arrows pointing to the screening rooms were posted. The nurses and clerks assigned to the one or more rooms in each building set up the equipment and information materials on the day of the screening.

At sites where employee participation lagged, a nurse or a clerk visited individual offices to encourage employees to take advantage of the screening. At the end of each session, the screening cards and other materials were returned to the OMS clinic.

The clerk at each site daily filed employees' records and summarized data compiled during the screening. Both the clerks and the nurses participated in the followup of employees who had elevated blood pressure readings during their first or second screening. Referral, monitoring, and education activities were done by the nurses at the screening sites or in the OMS clinics. Hypertensive employees screened initially in the OMS clinics or already being monitored regularly were also invited to enroll in a formal monitoring-counseling program. The evaluation plan was started during the building-to-building screening program and completed 6 months after the screening ended.

Results

The data presented here are drawn primarily from the specific evaluation activities designed to test whether the program's objectives were met. Each evaluation activity is cited, and the appropriate data follow.

Effectiveness of building-to-building screening effort. During the 6-month building-to-building screening effort, 5,781 or 43 percent of the 13,488 NIH employees were screened at 27 sites in the metropolitan area (see table). About two-thirds of all hypertensive employees

Results of primary screening of National Institutes of Health employees for high blood pressure at 27 worksites

Result	Total screened		Employees on treatment ¹		Percent of all screened employees on treatment
	Number	Percent	Number	Percent	
Normal	4,932	85.3	286	53.5	5.0
Borderline	453	7.8	101	18.9	1.7
High	396	6.9	148	27.7	2.6
Total	5,781	...	535	...	9.3

¹ 248 hypertensive employees (31.7 percent) were not on treatment at the time of screening; this number corresponds to 4.3 percent of the total number of employees screened.

who participated in the screening already had a diagnosis of high blood pressure and were receiving treatment. Among this group, slightly more than half had normal blood pressure readings at the time of screening. Of all the employees screened, 13.6 percent had a diagnosis of high blood pressure.

Need for two screenings. Of 338 employees reporting for a second blood pressure screening because of an elevated reading at the first screening, 46.5 percent had persistently high blood pressure readings, 19.5 percent were borderline, and 13.2 percent were normal; 20.8 percent did not return for the second screening. Thus, 32.7 percent of the employees tested a second time had either normal or borderline blood pressure. These data are consistent with those reported earlier (5); that is, approximately one-third of the screenees evaluated a second time do not have persistently high blood pressure.

Effectiveness of referral and followup efforts. All employees with high blood pressure were referred to their private physicians or a health services facility for further evaluation and treatment. If the employee did not return the completed information sheet to OMS, specific followups—including telephone calls and a letter—were initiated. Of 338 employees, 88 percent returned for a second screening, and 73 percent of 263 employees consulted with their private physicians as a result of an OMS referral.

Assessment of employees under adequate control. To evaluate the effectiveness of the NIH program, 96 health records of employees seen for blood pressure examination at the OMS clinics between 1977 and 1980 were selected at random from a computerized printout. Blood pressure readings taken in 1977, before the program started, were compared with readings taken between 1978 and 1980, after the program was

underway. Adequate control was defined as an average diastolic pressure < 90 mm Hg. Charts were included in the analysis if at least 2 blood pressure readings were recorded in 1977 and 5 in the period 1977-80; 52 charts met these criteria.

The 52 charts showed that 19 employees (37 percent) were under adequate blood pressure control for the entire period, and another 19 (37 percent) were brought under adequate control after the program was underway. On the other hand, the blood pressures of 10 employees (19 percent) were not adequately controlled for the entire period, and 4 employees (7 percent) had reverted to inadequate control after the program started.

Monitoring and education of hypertensive employees.

Based on the data obtained from the NIH program in January 1979, 292 of 410 known hypertensive employees were being monitored in the OMS clinics. Thus, more than 70 percent of the known hypertensives were participating in the program.

Discussion

The development, implementation, and evaluation of a worksite high blood pressure program has proved valuable from a number of perspectives. As a preventive health measure, high blood pressure screening and monitoring is one of the small number of medical interventions which clearly demonstrates that maintaining adequate control results in improved quality of life and longevity. Furthermore, the program has proved beneficial to both employees and management because (a) the free service to employees is a low-cost fringe benefit provided by management and (b) employees lose less time from work since they require fewer visits to their physicians.

The program also has provided an excellent opportunity for the OMS nursing staff to participate in the delivery of an important health service to employees. For example, the nurses see a group of hypertensives regularly and thus have continuity in the primary care and management of these employees. Some OMS nurses have also created and presented special high blood pressure education programs to selected employees at the worksite. These important efforts have been received enthusiastically by the employees who see the OMS as a concerned organization that tries to meet specific health needs of employees.

In terms of program development, the use of an advisory committee was beneficial for several reasons. The limited staff resources of the OMS were enhanced significantly by the advisory committee members who donated their time and talents in a variety of critical

areas not within the purview of an occupational medical staff. Thus, committee help was invaluable in identifying and securing space for the building-to-building program activities, as well as devising and producing publicity items, educational materials, and special forms for the program. Moreover, the participation of the Director of the Division of Personnel Management on the committee provided additional credibility and legitimacy to the program's activities, since a great deal of cooperation was required at all managerial levels while the program was being planned and implemented.

The total cost for the 6-month building-to-building screening and followup efforts was approximately \$9,900 or \$1.70 per employee screened. The cost covered the hiring and training of additional nurses and clerks as well as clerical and medical supplies and publicity materials. Subsequently, the program was conducted within the existing OMS clinics or by special arrangement at selected worksite locations by the regular staff. Therefore, the program costs were on a one-time basis, but the program benefits to employees are continuing.

Because the objective of screening 80-90 percent of NIH employees for high blood pressure during the 6 months was achieved only in part, several programmatic changes could be considered toward increasing the percentage of employees screened by use of the building-to-building approach. Such changes might include:

- Preparing alternative publicity efforts.
- Using a mobile screening team that goes to individual offices rather than relying exclusively on the employees' coming to a set location in a building. The program of the NHLBI, mentioned earlier, used the mobile screening team approach extensively in 1974; an impressive 80 percent of the NIH employee population was evaluated.
- Identifying time during the workday when employees are relatively free to participate in the screening. For example, the laboratory researchers generally did not participate because they were involved with their experiments. Consideration should be given to determining convenient times for such groups to be screened—perhaps during the lunch hour or a staff meeting might be feasible.
- Generating competition among employees in various buildings by publicizing the percentage of blood pressure checks done in each building. This approach has been used successfully in bond drives and charity campaigns.

In addition to the detection and referral of hyper-

tensive employees, other important benefits were gained by the screening program. Because an easily deliverable, relatively inexpensive preventive medical service was brought to employees in buildings distant from the OMS clinics, "healthy" employees who might not travel to a clinic for a blood pressure check were more easily reached. Such contacts should also encourage employees to take advantage of other services offered by the OMS. Another benefit arising from the staff's going to the various sites is that they gain firsthand knowledge of employees' work environment and the extent to which it may affect their health.

Finally, the observation that fully one-third of the persons who are hypertensive at the time of the first screening do not have a sustained elevated blood pressure on second screening strongly supports the two-step concept. Use of this two-step procedure reduces the excessive numbers of referrals that generate unnecessary expense and anxiety and strain limited health resources. Although some employees with elevated pressures only on the first screening might indeed be labile hypertensives, the OMS nurses advise those with normal readings on the second screening to have a blood pressure check annually. In this way, the OMS hopes to assure adequate followup within a reasonable time for persons who manifest elevated blood pressure occasionally.

To increase the likelihood of a successful referral, the OMS gave all persons who did not name a private physician on the screening form a list of local health care facilities. The provision of several alternatives for obtaining further evaluation and treatment is a critical and necessary component in any medical screening program.

Each referred employee was followed according to a prescribed plan. To improve the effectiveness of the referral and followup efforts, several programmatic changes were made in the first 6 months, based on the evaluation results as well as staff input. For example, greater success in followup efforts was observed if a nurse telephoned an employee to arrange an appointment at an OMS clinic for a blood pressure check. As a result, a nurse was assigned this duty in addition to her regular duties of examining and counseling employees. This personal contact by a nurse seemed to increase employee compliance because 40 of 60 employees previously unresponsive to telephone calls by other staff members and followup letters returned to see the nurse.

A review of employees' records for a 3-year period that included blood pressure observations before and after the program was started indicated that more than one-third of the employees achieved adequate

control of their blood pressure. In fact, the same percentage showed adequate control during the entire 3 years. These data suggest that the NIH Employee High Blood Pressure Program has increased the number of employees who are under adequate control of their blood pressure.

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SYNOPSIS

WASSERMAN, BARBARA P. (Occupational Medical Service, National Institutes of Health): *The employee high blood pressure program of the National Institutes of Health. Public Health Reports*, Vol. 97, March-April 1982, pp. 122-126.

Adequate control of high blood pressure remains a significant problem for many hypertensives detected through screening programs. The worksite is an ideal place in which to help workers control their high blood pressure. The Occupational Medical Service (OMS) at the National Institutes of Health developed and implemented a protocol to screen, refer,

follow up, and monitor hypertensive employees.

Approximately one-half of the workers were screened at a cost of \$1.70 per employee. Alternative approaches to improving the effectiveness of a building-to-building screening program were suggested. Of the employees screened, 85.3 percent had normal blood pressure, 7.8 percent had borderline blood pressure, and 6.9 percent had high blood pressure. The two-step screening process reduced by one-third the number of persons referred for evaluation of persistently high blood pressure. Among the hypertensive employees on treatment, 53.7 percent had nor-

mal readings. Of the 263 newly diagnosed and poorly controlled hypertensives who were referred to their private physicians for care, 73 percent were actually evaluated.

Measures to increase the likelihood of a successful referral and followup included providing a list of medical resources in the community and assigning a nurse rather than a clerk to contact employees for a repeat blood pressure check. Monitoring and education services are being provided to 70 percent of the known hypertensives. Adequate blood pressure control in NIH employees has improved by one-third as a result of the program.

The Status of Tuberculosis Control in New York City

ALJE VENNEMA, MD

MORBIDITY FROM TUBERCULOSIS in New York City has increased considerably over the last few years. The first significant rise in the disease was experienced in 1979. Before 1979 the number of cases reported steadily declined. The Bureau of Tuberculosis of the City of New York, Department of Health, began to verify reported cases upon the basis of bacteriological evidence of *Mycobacterium tuberculosis* in 1977. Of the 1,605 reported that year, 1,190 (74 percent) were verified as positive for *M. tuberculosis*. In 1978, 1,257 (96 percent) of 1,307 cases were positive for *M. tuberculosis*. In 1979, 1,530 cases were reported, of which 93 percent were positive. In 1980, 1,514 cases were reported, of which 93 percent were positive for *M. tuberculosis*. The preliminary figure for 1981 shows 1,550 cases of tuberculosis, of which 96 percent were verified for *M. tuberculosis*.

Other cases that were included in the tuberculosis count were added because of a biopsy result positive for tuberculosis, a positive tuberculin test, radiological evidence of the disease, or in some instances clinical evidence with a recommendation for treatment with two or more antituberculosis drugs. Nonbacteriological evidence was used, especially in assessing cases in children when a bacteriological result was negative or could not be obtained. The uniformity of the bureau's verification procedures from 1977 to 1981, the percentage of positive cases, and a laboratory surveillance program enabled the bureau to detect a trend of increasing morbidity (table 1).

A greater number of cases among the very young (manifested in more cases of miliary and meningeal tuberculosis) and a high number of reactivations contributed to the increasing morbidity. These two factors are direct indicators of the success or failure of a tuberculosis control program.

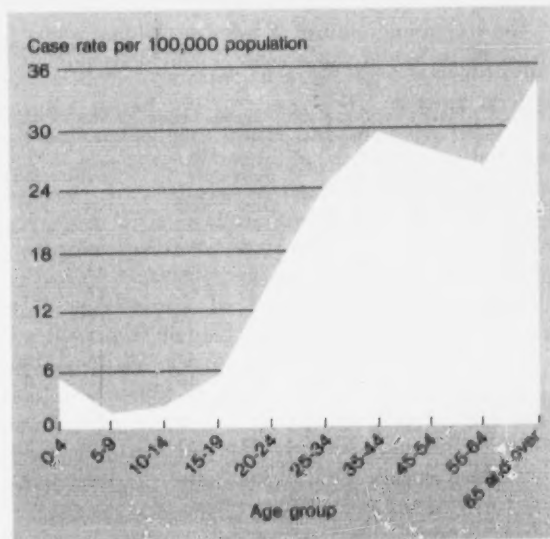
Kinds of Tuberculosis

Both pulmonary and extrapulmonary tuberculosis increased in 1979 (table 2) and remained at the same level in 1980 and 1981. In 1979, 1,450 cases were

verified as positive for *M. tuberculosis*, compared with 1,257 cases in 1978, a 15 percent increase. The ratio of pulmonary cases to extrapulmonary has remained about the same for many years. Cultures were positive for 1,258 (95 percent) of the pulmonary cases reported in 1979, 177 (16 percent) more than in 1978. The number of pulmonary cases with positive sputum cultures in 1979 was 1,234, of which 732 were smear positive for acid-fast bacilli.

The 207 extrapulmonary cases reported in 1979 comprised 14 percent of the total reported tuberculosis morbidity for that year and represented a 16 percent increase over 1978. Positive cultures were obtained in 192 (93 percent) of the 207 extrapulmonary cases reported, 42 (28 percent) more than in 1978. Compared with 1978, the increase in cases occurred at all extrapulmonary sites except the lymphatic system. Miliary cases increased from 13 in 1978 to 22 in 1979, and meningeal cases rose from 4 in 1978 to 14 in 1979. Not only the increases in miliary and meningeal tuberculosis, but also the increases in overall tuberculosis morbidity, presumably reflected an increase in the recent transmission of tubercle bacilli.

Figure 1. Case rate for newly reported tuberculosis, by age group, New York City, 1980



Tearsheet requests to Alje Vennema, MD, Director, Bureau of Tuberculosis, City of New York Department of Health, 125 Worth St., New York 10013.

Table 1. Number and rate of newly reported tuberculosis cases and of tuberculosis deaths, New York City, 1960-81

Year	Cases				Deaths			
	Number	Rate per 100,000	Percent change		Number	Rate per 100,000	Percent change	
			Number	Rate			Number	Rate
1960	4,699	60.9	...	...	810	10.4	...	...
1961	4,360	56.0	- 7.2	- 7.3	738	9.5	- 8.9	- 8.7
1962	4,437	57.0	+ 1.8	- 1.9	740	9.5	+ .3	0
1963	4,891	62.9	+10.2	+10.4	683	8.8	- 7.7	- 7.4
1964	4,207	53.7	-14.0	-14.6	581	7.4	-15.0	-15.9
1965	4,242	53.3	+ .8	- .7	592	7.4	+ 1.9	0
1966	3,663	46.6	-13.6	-14.4	537	6.7	- 9.3	- 9.5
1967	3,542	43.6	- 3.3	- 4.4	525	6.5	- 2.2	- 3.0
1968	3,224	39.7	- 9.0	- 8.9	485	6.0	- 7.6	- 7.7
1969	2,951	36.4	- 8.5	- 8.3	418	5.2	-16.0	-13.3
1970	2,590	32.8	-12.2	- 9.9	386	4.9	- 7.7	- 5.8
1971	2,572	32.6	- .7	- .6	310	3.9	-19.7	-20.4
1972	2,275	28.8	-11.5	-11.6	331	4.2	+ 6.8	+ 7.7
1973	2,101	26.6	- 7.6	- 7.6	262	3.3	-20.8	-27.3
1974	2,022	25.6	- 3.8	- 3.8	215	2.7	-17.9	-22.2
1975	2,151	27.2	+ 5.4	+ 6.3	208	2.6	- 3.3	- 3.8
1976	2,156	27.3	+ .2	+ .4	186	2.4	-10.1	- 7.7
1977	1,605	21.1	-25.6	-23.1	175	2.3	- 6.4	- 4.2
1978	1,307	17.2	-18.6	-18.5	168	2.2	- 4.0	- 4.3
1979	1,530	20.1	+17.1	+16.9	119	1.6	-29.2	-27.3
1980	1,514	19.9	- 1.0	- 1.0	135	1.8	+13.4	+12.3
1981 ¹	1,550	21.9	...	...	...	...	...	...

¹ Provisional figures based on 1980 U.S. Census figures.**Morbidity by Age Group**

Although in 69 percent of the tuberculosis cases reported in the city in 1980, the patients were older than 34 years, tuberculosis was still a significant problem among children, adolescents, and young adults (table 3 and fig. 1). In 69 cases (4.6 percent), the patients were under age 15, and in 479 cases (31.9 percent), they were under age 35. These results indicate that the disease was being transmitted from older patients to children.

The increasing number of cases in children under 5 years old is one of the greatest tuberculosis problems

that the city faces. Sixteen new cases in this age group were reported in New York City in 1977, 26 in 1978, 32 in 1979, and 37 in 1980. These figures represent a greater than 100 percent increase over 5 years and a case rate of 6.3 per 100,000, compared with a national rate for this age group of 5.4 in 1978. One might assume that the cases in the children under age 5 were discovered because they were household contacts of persons with known cases of tuberculosis. Instead, most of the cases were discovered only when the children themselves exhibited tuberculosis symptoms. The cases in young children were equally dis-

Table 2. Newly reported tuberculosis cases by site of disease and by bacteriological status, New York City, 1979 and 1980

Predominant site	Total cases		Percent of total		Culture ¹		Smear only ²		Negative ³		No teriological test	
	1979	1980	1979	1980	1979	1980	1979	1980	1979	1980	1979	1980
Pulmonary	1,323	1,284	86	85	1,258	1,199	29	37	23	23	13	25
Extrapulmonary	207	230	14	15	192	196	6	9	6	9	0	5
Pleural	35	55	17	24	35	43	0	8	0	4	0	0
Lymphatic	55	66	27	28	50	56	4	4	2	2	0	4
Bone and joint	14	11	7	5	12	10	2	0	0	0	0	1
Genitourinary	38	41	18	18	38	39	0	2	0	0	0	0
Miliary	22	18	11	8	19	15	1	3	2	0	0	0
Meningeal	14	21	7	9	14	17	0	1	0	3	0	0
Peritoneal	7	7	3	3	6	6	1	1	0	0	0	0
Other	21	11	10	5	18	10	1	1	2	0	0	0
Total all sites	1,530	1,514	100	100	1,450	1,395	38	57	29	32	13	30

¹ Positive culture with positive, negative, or unknown results for smear.² Histology positive or smear positive and no culture done.³ All cultures were negative.

Table 3. Newly reported tuberculosis cases by patient's age, race, and sex, New York City, 1979 and 1980

Age (years)	Total all races	White ¹		Black ²		Asian	
		Male	Female	Male	Female	Male	Female
0-4:							
1979	32	8	4	14	4	2	0
1980	37	10	7	12	7	0	0
5-9:							
1979	8	2	3	1	2	0	0
1980	14	3	1	4	4	2	0
10-14:							
1979	13	2	2	3	5	1	0
1980	18	2	2	5	8	1	0
15-19:							
1979	34	8	4	8	12	0	2
1980	42	10	5	11	12	1	3
20-24:							
1979	99	24	18	26	19	7	5
1980	96	15	13	28	28	7	5
25-34:							
1979	254	59	26	78	63	18	10
1980	272	45	29	112	60	15	11
35-44:							
1979	266	60	31	107	47	11	10
1980	244	62	25	95	45	9	8
45-54:							
1979	264	90	27	93	36	13	5
1980	231	77	26	83	33	8	4
55-64:							
1979	230	88	28	69	27	14	4
1980	216	72	37	60	32	8	7
65 and over:							
1979	330	138	80	52	35	20	5
1980	344	149	78	48	39	17	13
Total:							
1979	1,530	479	223	451	250	86	41
1980	1,514	445	223	458	268	68	52

¹ Includes white Hispanics.

² Includes black Hispanics.

tributed over the city's five counties. No cluster effect was observed, and no cases were reported among refugees. Of the cases in 1980 in children under 5, 17 were in whites, 19 in blacks, and 2 in Asians (both of the Asian children had been born in this country). Because the cases in the age group under 5 years have not been adequately investigated, few of the sources of the children's infections have been identified.

The increase in tuberculosis in children is probably due to an increase in transmission of bacilli to children by parents who have tuberculosis. The existence of meningeal tuberculosis and miliary tuberculosis in children supports this view.

The 1980 tuberculosis case rate shows a decline from the 0-4-year-age group to the group 5-9 years, followed by a gradual increase to the 35-44-year group (fig. 1). The case rate curve drops once more as it approaches the 55-64-year group, and then rises sharply as it moves toward the group over age 64. The case rate curve has remained about the same over the years except for the recent rise in the 0-4-year-old group. Before 1979, the number of cases in the younger age

groups had been continuously declining, whereas the number among the older age groups was continuously increasing.

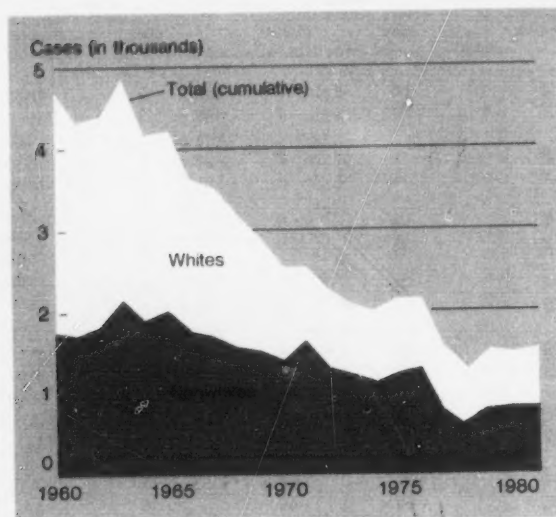
Morbidity by Race

Just as cases were reported in all age groups throughout the period 1960-80 (table 3), cases were also reported among both whites and nonwhites (fig. 2).

The most basic difference in morbidity was between whites and nonwhites. As figure 3 shows, nonwhites accounted for a greater percentage of the city's 1980 tuberculosis morbidity than whites (56 percent versus 46 percent), although they comprise only 23 percent of the population. In 1980, the corresponding percentages were 44 and 56. Whites accounted for 46 percent of the new cases in 1979, blacks for 46 percent, and Asians for 8 percent. For 1980, the corresponding percentages were 44, 48, and 8. Thus the trend of increasing tuberculosis was appearing in all racial groups.

Hispanics accounted for 32 percent of the new cases in the white group in 1979 and 35 percent in 1980.

Figure 2. Newly reported cases in whites and nonwhites, New York City, 1960-81



NOTE: 1981 figures are provisional, based on 1980 U.S. Census figures.

New cases in white Puerto Ricans increased from 40 in 1978 to 153 in 1979, decreasing to 130 in 1980.

Cases in blacks increased from 512 in 1978 to 701 in 1979 and 726 in 1980, accounting for 85 percent of all cases in nonwhites in 1979 and 86 percent in 1980. There were 18 cases in black Hispanics in 1979 and 27 in 1980. The other cases in nonwhites occurred in Asians, among whom cases rose from 61 in 1978 to 127 in 1979 and then decreased to 120 in 1980. The 1979 increase among Asians was not due to an influx of recent immigrants; only 4 cases were dis-

Figure 3. Percentage distribution of newly reported cases of tuberculosis and of population, by race, New York City, 1980

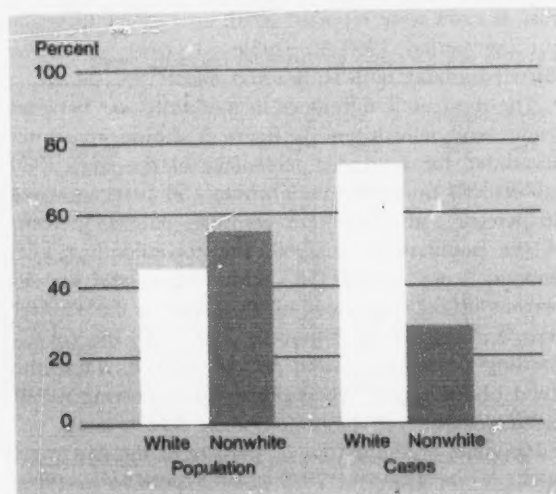


Table 4. Newly reported tuberculosis cases and rates for newly reported cases, by county, New York City, 1977-80

County, cases, and rates	1977	1978	1979	1980
New York (Manhattan):				
Cases	503	475	587	554
Rate per 100,000	34.6	32.7	40.4	38.1
Bronx:				
Cases	260	180	202	196
Rate per 100,000	18.8	13.0	14.6	14.1
Kings:				
Cases	599	405	489	500
Rate per 100,000	24.2	16.3	20.1	20.2
Queens:				
Cases	220	228	223	241
Rate per 100,000	11.1	11.6	11.2	12.3
Richmond:				
Cases	23	19	20	23
Rate per 100,000	7.0	5.8	6.1	7.0
Total (New York City):				
Cases	1,605	1,307	1,530	1,514
Rate per 100,000 ..	21.1	17.2	20.0	19.9

covered among the Indochinese refugees entering the city in 1979, as compared with 12 in 1980. Five reactivations of the disease among Asians were estimated to have occurred in 1979. (The Tuberculosis Bureau screens all newcomers and operates two clinics for this purpose.)

Morbidity by County

Each of the five counties of which New York City is composed is divided into health districts. In 1979, some residents of every health district in the city were found to have newly reported tuberculosis cases. The case rate for each health district was proportionate to its population density and reflected its socioeconomic status. In the period 1977-80, the rate of newly reported cases ranged from 6.1 per 100,000 for Richmond County to 79.0 for the Lower East Side Health District of Manhattan, as table 4 shows. Manhattan, with 587 new cases, had a case rate of 40.4 in 1979 and 38.1 in 1980. Practically all areas of Manhattan have severe tuberculosis problems, but these problems are even more serious in the Lower East Side, the Lower West Side, and the Central Harlem District—all economically depressed areas.

Mortality

In 1979, 119 persons in New York City died from tuberculosis, compared with 168 in 1978—a 29 percent decline. The tuberculosis death rate was 1.6 per 100,000 population. Twenty-nine of the cases were new ones that were only discovered at death. This figure represents a decline of 55 percent from 1978,

when there were 64 cases that were not discovered until death. Even though this decrease is significant, lack of knowledge that the 29 decedents had tuberculosis until their deaths is a cause for concern. The cases found at death (autopsy) were all in persons over the age of 30. The following table shows the sex and age group of the decedents in 1979 and 1980.

<i>Sex and age group (years)</i>	<i>1979</i>	<i>1980</i>
Total males	21	19
25-44	6	4
45-64	6	5
65 and over	9	10
Total females	8	11
25-44	5	3
45-64	1	4
65 and over	2	4
Both sexes	29	30
25-44	11	7
45-64	7	9
65 and over	11	14

Controlling the Infectious

Patients with tuberculosis can be cured provided that they remain continuously under treatment and complete their recommended course of at least two or more effective antituberculosis drugs. If such a regimen is not maintained, the patient will not be cured and may well become infectious again—or even worse—never become noninfectious. Cases reported and counted in previous years which are reactivated because the persons have not been under medical supervision for 12 or more months are defined as new cases and are verified and counted along with other cases discovered the same year. Reactivations indicate that the control program has failed to contain the disease, since the persons with the reactivated cases are also possible transmitters of the tubercle bacilli.

There were 177 persons with cases of reactivated disease in New York City in 1979 and 135 in 1980, compared with 67 in 1978. These reactivated cases accounted for 12 percent of the total 1979 tuberculosis morbidity. Ninety-three percent of the reactivated pulmonary cases and 96 percent of the total reactivated cases in 1979 were culture positive. Seventy-five percent of the total reactivated cases were in persons over age 44, 58 percent in nonwhites, and 76 percent in males.

During 1980, a total of 1,815 patients were added to the register of patients whose tuberculosis treatment was to be supervised, and 1,831 patients were discharged from supervision. In December 1980, there were 2,702 patients under supervision, 2,432 of whom were ambulatory. Of the patients discharged in 1980, 60 percent had completed their supervised treatment, 21 percent were lost to supervision, 12 percent had

died, and 7 percent had moved to another jurisdiction. Tuberculosis patients are medically supervised either by the public sector (the city health department or municipal hospital clinics) or by the private sector (voluntary hospital clinics or municipal hospital clinics). Of the 2,432 patients under supervision in December 1980, the health department supervised 17 percent, and municipal hospital clinics supervised 44 percent; the remainder were supervised by the private sector. Although clinics and physicians in the private sector diagnose and report many tuberculosis cases, in 1980 they provided medical supervision for only 39 percent of all patients with the disease.

Only 60 percent of the tuberculosis patients under supervision in 1980 were seen by a medical supervisor (medical doctor or paraprofessional) for evaluation and chemotherapy. In the period Oct. 1 1980–Dec. 31, 1980, 1,347 tuberculosis patients were lost to supervision and presumably were not on a drug treatment regimen. Such patients become candidates for reactivation of their disease and transmission of the tubercle bacilli to others; they may also develop drug resistance. Only a little over half of the 2,250 patients for whom two or more antituberculosis drugs had been recommended, had an evaluation done of their bacteriological status while they were undergoing treatment. The bacteriological status of 548 patients whose sputum culture had been positive before Oct. 1, 1980, should have been evaluated. Because they were not, the Tuberculosis Bureau was unable to determine whether the 548 were still infectious.

Tuberculosis patients on chemotherapy are evaluated in respect to the continuity of their drug treatment during the initial 12 months and in respect to their completion of the prescribed course of drug treatment. We evaluate cohorts of reported cases each quarter of the incidence year. When a high level of achievement is registered in terms of continuity and completion of treatment, the bureau is assured that infectious cases will become noninfectious and that the noninfectious cases will not become infectious. Provided that effective antituberculosis drugs have been recommended and that the patient takes them with minimal interruption to completion of the prescribed course, he or she will become noninfectious within a short period and be cured. The optimal objectives of the bureau and of the Centers for Disease Control are (a) to have at least 95 percent of the patients who are started on drugs take them without interruption for 12 consecutive months and (b) to have 90 percent of the patients complete their prescribed treatment course. The following table shows the extent to which we met these goals.

<i>Cohorts of patients</i>	<i>Percent on continuous treatment for 12 months</i>	<i>Percent who completed treatment</i>
<i>1977</i>		
January-March	59	49
April-June	59	66
July-September	58	52
October-December	52	64
<i>1978</i>		
January-March	42	45
April-June	78	61
July-September	58	46
October-December	50	56
<i>1979</i>		
January-March	57	63
April-June	58	...
July-September	58	...
October-December	52	...
<i>1980</i>		
January-March	68	...

NOTE: Lenders (...) indicate scheduled treatment period was not up.

Reasons for Treatment Failures

Analysis of our results based on the two indicators—percent on continuous treatment for 12 months and percent who completed treatment—showed that we had severe control problems. The low percentages for continuity and completion of treatment were probably due to many factors: failure to sufficiently alert the patient to the seriousness of his or her disease and the need for chemotherapy, failure to provide an effective transition for the patient from an inpatient to an outpatient treatment setting, failure to provide, as a general policy, more frequent supervision (monthly or more often) for ambulatory patients who are having difficulty complying with their treatment regimen, failure to report to the bureau when a patient breaks supervision or refuses to accept treatment, or failure to inform the bureau after such a break has occurred and a patient is lost or becomes complacent about taking his or her prescribed drugs.

Problems, conceptions, and attitudes of patients that may help account for the low continuity and completion percentages are alcohol and drug abuse and other social problems that contribute to noncompliance; assignment of a lower priority to health matters than to financial difficulties and living conditions; patients' misconceptions that they are actually in good health—a misconception that causes them to stop taking their prescribed drugs after a few weeks or months; and failure to keep clinic appointments because of frustration with the health care system.

Factors in the tuberculosis control program itself that may have contributed to the low percentages of continuous and completed treatment include inadequately trained, incompetent, unmotivated, and insufficient field staff.

The sputum cultures of patients who had a positive result when their cases were first reported are reevaluated after 3 months of supervision and treatment and again after 6 months to see if the culture has become negative. We evaluate patients with positive sputum cultures quarterly, using the same cohorts as in checking drug continuity and completion of treatment. The conversion of the sputum culture to negative is a companion performance indicator to the drug continuity indicator, in that it enables the bureau to measure its success in rendering the infectious noninfectious. Provided that effective antituberculosis drugs have been recommended and the patient has been managed so that continuity in his or her drug ingestion is maintained until completion of the regimen, in 75 percent of the cases reported with a positive sputum culture, conversion to negative can be expected within 3 months and in 65 percent, within 6 months. The following table shows our results based on these performance indicators.

<i>Cohorts of patients</i>	<i>Percentage whose positive sputum culture converted to negative</i>	
	<i>Within 3 months</i>	<i>Within 6 months</i>
<i>1978</i>		
January-March	30	42
April-June	33	54
July-September	32	48
October-December	34	54
<i>1979</i>		
January-March	32	51
April-June	35	44
July-September	41	51
October-December	41	51
<i>1980</i>		
January-March	26	41
April-June	28	41
July-September	22	49

The low percentages based on the performance indicator of conversion of sputum culture to negative are due to problems similar to those described in connection with the indicators for drug continuity and completion of treatment. Other factors that contributed to the substandard achievement as measured by this indicator include the supervising facilities' failure to obtain followup sputum cultures when patients are clinically and radiologically improved or when they are unable to produce sputum.

New York City's tuberculosis problem stems from reporting and financial difficulties combined with the loss of personnel that has taken place over the last years due to loss of funds for the control program. However, the total morbidity and age distribution for the disease suggest that tuberculosis is an old problem. It may well be that there is a pool of infected persons

Table 5. Identification and examination of close contacts of persons with new tuberculosis cases, New York City, 1977-79

Status of contacts	1977	1978	1979
Identified:			
Total number	2,177	1,416	1,679
Number per case	2.7	2.4	2.3
Examined:			
Total number	1,734	1,205	1,384
Percent of contacts identified ..	80.0	82.0	82.0
Not infected:			
Total number	1,117	731	923
Percent of contacts examined ..	64.5	61.0	67
Number on treatment	254	153	165
Percent of noninfected contacts on treatment	23.0	21.0	18.0
Infected:			
Total number	574	454	428
Percent of contacts examined ..	33.0	37.5	31.0
Number on treatment	492	382	371
Percent of infected contacts on treatment	86.0	84.0	87.0
Tuberculosis diagnosed:			
Number	43	20	23
Percent of total contacts	2.5	1.5	2.7

in the city who break down with tuberculosis as time goes by. If that is the case, New York City will have a continuous tuberculosis problem for many years to come. The only way to overcome it will be to strengthen our reporting and control efforts and ensure that patients complete their prescribed course of treatment.

Followup of Patients' Contacts

All persons with reported cases who are considered capable of transmitting tubercle bacilli are interviewed to elicit the names of all persons connected with them who are at risk of becoming infected. The contacts so

identified are classified as close or casual, based upon the infectiousness of the patient with the source case, the environmental factors in exposure, and the duration of the exposure.

The bureau's success in preventing infection and disease can be measured by indicators of its success in the followup of contacts. At least 95 percent of the close contacts of the patient with the source case who are identified should be examined and started on preventive chemotherapy, and 90 percent of the contacts who are put on preventive chemotherapy should complete their prescribed course of treatment. Table 5 shows the extent to which New York City achieved these goals in the period January 1977-80.

Many factors account for the low yield in contacts identified and examined, the low percentage placed on preventive treatment, and the high percentage with infection and disease. Slow reporting of cases to the Tuberculosis Bureau results in delays in the identification, examination, and preventive treatment of contacts, as well as in the bureau's inability to locate patients after they leave the hospital. Failure to explain the diagnosis or the disease process to patients results in their being uncooperative or unconcerned about their contacts. Failure to obtain the proper address of a patient at admittance greatly increases the chances that the patient will be lost to followup. Another factor in the low yield of contacts identified and examined is that patients, because of personal problems or a fear of social stigma, often refuse to be interviewed or fail to provide the names of all their contacts. The patients' desire for anonymity combined with their transiency make contacts difficult to locate. Lack of epidemiologic skill on the part of the field staff and use of poor interviewing techniques probably also contribute to the low yield in the followup of contacts.

SYNOPSIS

VENNEMA, ALJE J. (City of New York Department of Health): *The status of tuberculosis control in New York City. Public Health Reports, Vol. 97, March-April 1982, pp. 127-133.*

Problems in tuberculosis control still exist in New York City. They range from an increase in the incidence of the disease to the discovery of new cases in children under 5 years of age. Ninety-three percent (1,395) of the cases reported in 1980 were verified by cultures positive for

tuberculosis. The rest of the cases in the 1980 tuberculosis disease count were verified by histology or a physician's recommendation for treatment with two or more antituberculosis drugs.

Of the tuberculosis at extrapulmonary sites, pleural meningeal and miliary tuberculosis, as well as genitourinary tuberculosis, ranked high in incidence in 1980. New tuberculosis cases occurred in all age groups, but the 37 cases in the age group 0-4

years is alarming and indicates a high rate of transmission of tuberculosis from parents to children. Performance indicators of the Centers for Disease Control show that in terms of drug continuity, completion of treatment, and bacteriological conversions to negative, a great deal needs to be done in New York City.

The tuberculosis mortality rate for the city has been showing a steady decline over the years; it was 1.8 per 100,000 population in 1980.

The Promise of Regional Perinatal Care as a National Strategy for Improved Maternal and Infant Care

KENNETH G. JOHNSON, MD

THE STRATEGY OF REGIONAL PLANNING has been the subject of much attention in recent years. In the history of the delivery system for perinatal care, the attempt to broadcast the benefits of modern perinatal medicine to entire regions, to every pregnant woman, and to every hospital and provider within each region is a startling development. From 1975 through 1980, when I was engaged in efforts to regionalize perinatal care in the United States and Canada, I was impressed not only with the dedication of the obstetricians and pediatricians who chose to implement regional programs but also with the evidence of their success. Although I am neither an obstetrician nor a neonatologist—but interested in improved systems of care, especially for vulnerable groups—I have found much that is good in regional perinatal care. I therefore offer regional perinatal care as a highly useful strategy for improving maternal and infant care.

In the early 1970s, much optimism was generated among the U.S. leaders in perinatal medicine about the potential benefits of regional planning. It was postulated that a regional plan would ensure access to the appropriate level of care for all women and their newborn within an entire system. The optimism was apparent in a 1975 report, "Toward Improving the Outcome of Pregnancy" (1). The issuance of this report, which emphasized measures that would promote com-

munications among regional providers and integration of services relating to perinatal care, was a critical incident for the delivery system for perinatal care. That a group of health professionals was calling voluntarily for regionalization of care could be considered both radical and naive in the United States. Regionalization of health services has been the hope of many in this country for the past 50 years.

The difference between previous calls for regional planning and that called for in "Toward Improving the Outcome of Pregnancy" was the specificity for the regional perinatal plan and a high level of confidence in the potential benefits of regional perinatal care. Such confidence was not apparent from the mid-1920s to the mid-1940s. There were few perinatal interventions, except for the hospital-based premature nursery. The paradox relating to this period was that the long-term outcome of surviving low birth-weight infants, as documented by Hess (2), was remarkably good. For high-risk infants, it was a period of survival of the fittest.

The scientific base of neonatology was advanced in the mid-1940s, but with many hard lessons to be learned about matters such as the use of oxygen, vitamin K, and the choice of antibiotics. The outcome of surviving infants, measured in terms of growth and development at later birthdays, was discouraging and did not approach Hess' results. Neonatal mortality rates declined, but it was the period of survival of the not so fit. The outcome raised serious ethical questions about the appropriate use of technology.

Teasheet request to Kenneth G. Johnson, MD, Director, Kingston Hospital Health Services Research Center, Kingston, N. Y. 12401.

However, confidence has been restored by a splendid series of advances in both neonatology and maternal and fetal medicine. The technology has proved both safe and effective, as measured by the long-term outcome of surviving infants in the low and very low birth-weight categories. The data in figure 1 are cited from published reports (3-14) of followup studies, from selected centers, of high-risk infants at varying birth weights for the period 1955 to 1976. Although the results were not applicable to entire regions, they were the basis for confidence—80-90 percent of the infants weighing less than 1,500 grams at birth were spared severe disability.

It is of interest that concurrent with advances in perinatal medicine the public health scoreboard changed from the gross measure of infant mortality to a measure of performance that accounted for fetal losses and stillbirths—perinatal mortality. A contemporary measure in the face of declining mortality rates is the quality of life of the surviving infant. In the past 20 years we have moved along a continuum of increasing expectations, from life or death to the quality of the survivor and to the social environment that will provide every child with a fair chance for optimal growth and development.

Regional Perinatal Care

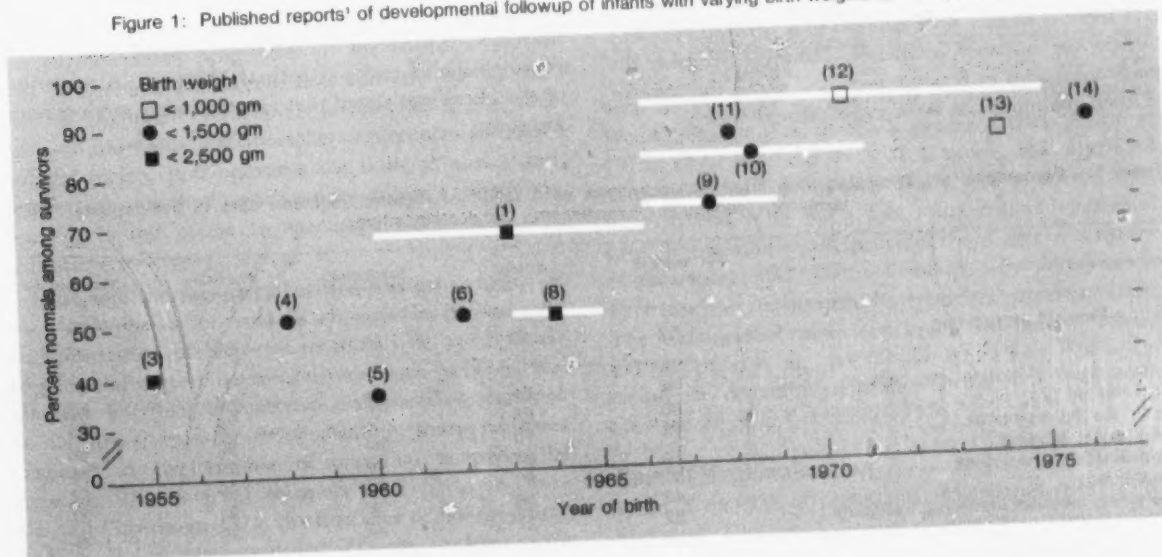
There is a danger in citing regional perinatal care as the model strategy of the delivery system for perinatal care. How well the system functions is determined by a

complex interaction of natural and social supports, the physical environment, and the medical support system. Within the highly complex delivery system for perinatal care, it is difficult and unwise to choose one determinant as the most important. The effects of poverty, unplanned pregnancies, poor nutrition, and other social factors contribute enormously to the poor outcome of pregnancy. Always implicitly—and sometimes explicitly—in the providers' view, the concept of risk is what drives the system. To identify those mothers and infants who are at high risk of a poor outcome is the common strategy. The strategy is preventive—the earlier the application, preferably before conception, the better.

Nonetheless, even with the virtual elimination of social and economic gaps, we would still have high-risk mothers and infants in need of effective medical intervention. To develop an effective delivery system, we cannot afford significant omissions. Uneven access to effective perinatal medical care has been and remains a problem. Thus, I believe that all segments of providers of maternal and infant care would welcome the new strategy of regional perinatal care.

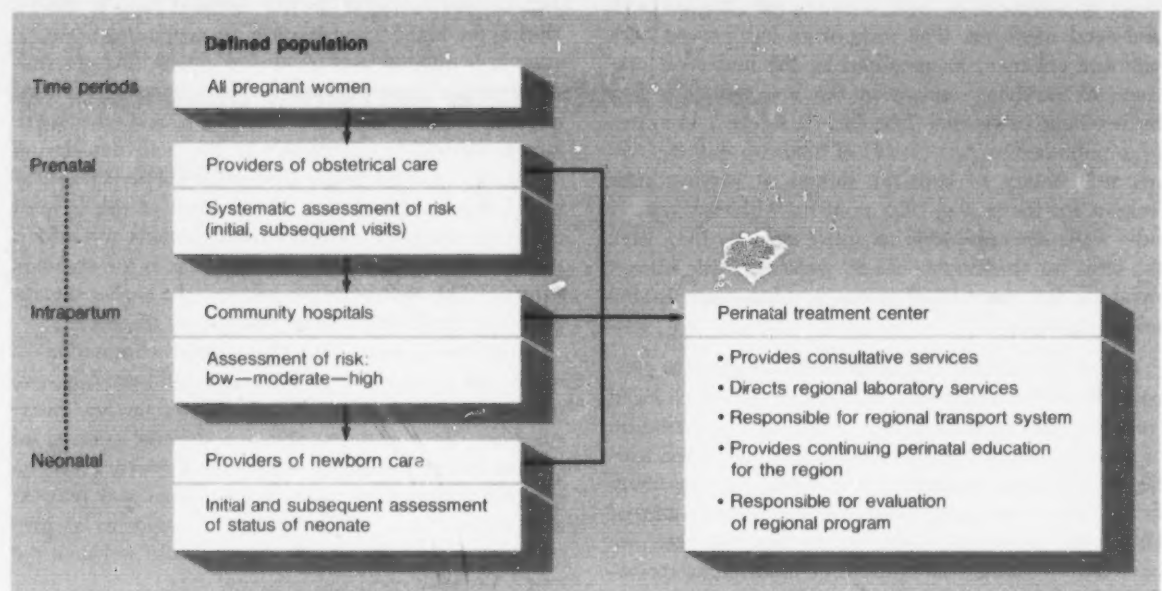
What most perinatologists would agree constitutes a regional plan of perinatal care is shown in figure 2. The regional plan is a network, within a defined region, of all providers of care at all levels of care. The target population includes all pregnant women. The functional elements include risk assessment, the use of a uniform information system, and the services provided by the regional perinatal center to the region—for example, consultation services, laboratory services, con-

Figure 1: Published reports' of developmental followup of infants with varying birth weights at 2-10 years of age



*Numbers in parentheses are references.

Figure 2: A regional plan of perinatal care



tinuing education and training, and treatment services. The only reliable identifier of a participating hospital in this model is its inclusion in the regional information system.

Within the past 6 years, regional perinatal plans have become ubiquitous. Every State has some kind of regional plan. The majority of the States, however, do not have regional information systems, and many have little obstetrical outreach from the perinatal center to the region. Regional information systems are expensive, and there is usually little support in a perinatal center's budget for outreach activities. However, despite the many variations in regional perinatal plans, the concept of such planning has been implemented widely.

What are the benefits of regional perinatal care? As shown in tables 1 and 2, the results of the 1979 American College of Obstetrics and Gynecology's surveys of obstetricians practicing in five regions where perinatal care had been regionalized help to identify what physicians perceive as benefits (15). The physicians reported improved access to consultation and care for their high-risk patients and for themselves, improved educational programs. They also reported substantial improvements in facilities and equipment in community hospitals, in the level of obstetrical nursing, and in the coordination of regional perinatal services. A minority of the physicians stated that anesthesiology services had improved.

Table 1. Percentage of physicians who cited improvements as a result of regional perinatal care in five regions, 1979 American College of Obstetrics and Gynecology survey

Improvements	Cleveland (N = 120)	Arizona (N = 182)	Tennessee (N = 177)	Wisconsin (N = 193)	Massachusetts (N = 235)
Percent responding	57	58	62	57	46
Access to consultation and care	74	64	66	57	53
Educational programs	90	88	...	72	68
Facilities and equipment	75	75	63	50	54
Obstetrical nursing	72	64	60	53	51
Coordination of services	61	80	69	56	62
Anesthesia	49	36	39	24	37
Referring mothers (maternal transports)	32	27	33	20	32

SOURCE: Reference 15.

Table 2. Percentage of physicians who cited improvements as a result of regional perinatal care in Cleveland and Arizona, by level of hospital, 1979 American College of Obstetrics and Gynecology survey

Improvements and hospital level	Cleveland (N = 120)	Arizona (N = 192)
Access to consultation and care:		
I	62	91
II	79	63
III	63	51
Educational programs:		
I	100	81
II	87	84
III	95	95
Referring mothers (maternal transport):		
I	42	42
II	33	44
III	20	3

NOTE: Hospital levels are defined in reference 1. Source of data reference 15.

Benefits of Regional Plans

What can be said about the feasibility of regional perinatal plans? Whether any set of personal health services in the United States could be regionalized was a worrisome question in 1975 for the Robert Wood Johnson Foundation when it invested \$20 million in demonstrations of regional perinatal care in 8 U.S. regions. Five years later, feasibility was not an issue. For example, in the Cleveland region 64 percent of all hospitals were participating fully in the regional network, and 76 percent of all pregnancies and births were in the system. In Arizona, 57 percent of all annual pregnancies and births were included in the regional information system; the corresponding proportion in the Syracuse region was 70 percent. The system that accounts for 70 percent of perinatal events in a given year is one that provides morbidity and mortality conferences throughout the region, that upgrades the skills of nurses and physicians, and that provides easy access to consultation—including access to specialized laboratory and outpatient services.

How well the regional plan is working to anticipate poor outcome is reflected in changes in the number and proportion of high-risk mothers who are referred to perinatal centers before delivery; such patients usually are described as maternal transports or transfers. In the first 2 years of regionalization, sharp increases occurred in the number of maternal transfers. In Arizona, 300 maternal transfers took place in Tucson and Phoenix in 1975, the first year of the program; in 1979, the number exceeded 600—an underestimate because this number did not include direct admissions.

For example, in 1 Phoenix perinatal center from July 1979 to June 1980 there were 196 maternal transports and 340 direct admissions of high-risk maternity patients.

The benefits for a high-risk maternity patient who delivers in a perinatal center have been documented by Harris and associates (16) in a comparison of the outcome of neonates born to maternal transports with the outcome of neonates transferred after birth. For infants weighing less than 1,500 gm and born before 34 weeks' gestation, the difference in survival was significant. Followup by Sell (17) of the survivors from each group indicates a persistent and significant advantage in terms of decreased morbidity for the neonates born to mothers who were transported before delivery.

The great surge in the number of maternal transports says little about preventive strategy if unaccompanied by a decline in neonatal transports. In Arizona, while the rate of maternal transports rose over a 5-year period, 1976-80, from 2.6 to 5.2 per 1,000 live births—an increase of 100 percent—the rate of neonatal transports declined from 16.0 to 13.9, a 13 percent decline. A confounding factor in the interpretation of the decline in neonatal transports is that with a regional plan the very low birth-weight infant is more likely to be considered viable and a candidate for transfer. To the extent that such transfers occur, the tradeoff of maternal for neonatal transports is obscure.

Regional perinatal care can be considered to be feasible and to have generated added benefits to the high-risk mother and infant, as well as to physicians and other health care professionals. But, has the decrease in neonatal mortality been associated with an increase in infant morbidity? Shapiro and associates (14,18) address this question in their reports on two rounds of morbidity surveys of 1-year-olds who were born in the eight regions participating in the Robert Wood Johnson Foundation's program that began in 1975. Their first report is of a survey that included approximately 5,000 infants aged 1 year who were born in 1976 and were not subjects for regional perinatal care. The second report provides the results of a survey of approximately 2,900 age-1 infants who were born in 1978 and were subjects for regional perinatal care. The investigators' major conclusion was that the results did not provide support for the hypothesis that a decrease in neonatal mortality is associated with an increase in infant morbidity.

Cost of Regionalization

What is the cost of regionalizing perinatal care? I. R. Merkatz (Cleveland Perinatal Program, unpublished data, 1978) estimated the cost of maintaining a re-

gional information system and of a staff to provide consultative services to the region to be about \$20 per mother-infant pair or \$200,000 per 10,000 deliveries a year. This in an incremental cost, offset to some extent by the current cost to hospitals of maintaining obstetrical and neonatal records. Obviously, this cost is just a fraction of the cost of providing direct perinatal services in a region.

It is unfortunate that support for regional perinatal programs is being sought in the current environment of economic stringency. I cannot cite any studies relating to the evaluation of the efficiency of regional perinatal care. In the process leading to a statement relating to efficiency, the program in several regions can be defined clearly; however, it would be difficult to get a handle on a comparison region in a "no program" State. I believe that we have sufficient data to define the effectiveness of the program, for example, that the program does more good than harm or that it projects beneficial effects in the future in terms of quality adjusted-life years, but it is unlikely that corresponding information will be available (mainly because of cost) in a "no program" comparison region. I believe that the case for regional perinatal care rests presently on its presentation as a prudent investment in the organization of a system to improve standards of perinatal care and to assure access of the pregnant woman and newborn to the level of care they require. If we consider the alternative, at best an informal centralized network, regional perinatal care is a prudent investment.

Discussion

For the first time in the otherwise dismal history of efforts to regionalize personal health services, vigorous support for regional perinatal care has emerged from the medical professional sector. Further, several demonstrations of regional perinatal care have provided data attesting to its feasibility, acceptance, effectiveness, and safety.

The enthusiasm for regional perinatal care represents an enormous change in the national perspective on the care of mothers and infants. The expressions of its supporters, relating to what regional perinatal care can accomplish in the United States, are in sharp contrast to the frequent recitation, especially in the 1960s, about our demographic dissimilarity to Sweden or about the ignorance and apathy of the poor who contribute heavily to the nation's infant mortality rates. In the 1970s, perinatologists shifted the burden to the perinatal delivery system to provide access to the needed level of care.

Another good feature about regional perinatal care—and one that is largely unappreciated—is its melding of the private sector with the public sector in a common mission. The leadership in regionalizing perinatal care has come almost exclusively from the university medical center. The director of a regional perinatal program soon becomes greatly interested in how the multiple public programs—maternal and child health, sudden infant death, family planning, nutrition and dietary services, and developmental disabilities—contribute to regional perinatal care, as well as how administrative regulations may be true obstacles in establishing a network of care. I believe that the level of interest generated by regional perinatal care in coordinating and integrating the resources and actions of both the public and private sectors is unprecedented in our society.

When we consider the deep pockets of rural and urban failures of the nation's perinatal delivery system, we should welcome their inclusion in an orderly network of perinatal care. Bringing the ghetto hospital and the isolated rural hospital into the mainstream is clearly different from neglect. Unfortunately, some regional perinatal care is not perceived as a highly useful network that provides more switching points and interfaces than we have enjoyed before. It is also unfortunate that regional perinatal care is often misperceived as centralized care—equated with access to the sophisticated technology of the tertiary care center.

Regional perinatal care is not a panacea, but it is a strategy that holds much promise. Despite its apparent ubiquity, such care still has far to grow before it will have a substantial impact on improving the outcome of pregnancy, and unless it is joined closely to the social support system its benefits will be limited.

The replication of regional perinatal networks throughout a State or the nation is not likely to proceed as well as the eight demonstrations of the Robert Wood Johnson Foundation's program or the many other demonstrations now in place. Primarily, the demonstrations were purely voluntary and their leadership was inspired. Every State that wishes to have a system of perinatal care will have to invest in building a broad constituency among providers after it has settled its own internal administrative issues. Hospital administrators and physicians nationwide have become sensitized to regulation; thus, they are likely to interpret regional planning of perinatal care, when sponsored by government, as a threat. This is especially true of hospitals with low-volume obstetrical services,

for example, fewer than 1,000 deliveries per year, whose continuing existence has been threatened by regulatory agencies in States such as Massachusetts and New York.

Regional networks of perinatal care can provide a substructure to which multiple programs that provide an array of services to mothers and infants can be affixed. The usefulness of the regional information system in identifying newborns who are at high risk of serious handicaps is impressive. The regional information systems in the 8 regions of the foundation's program now account for 60-70 percent of all births annually in those regions. Further, regional perinatal networks representing an unusual melding of efforts in the public and private sectors form a unique structure for coordinating diverse efforts and interests in maternal and infant health.

Perhaps the best feature of regional perinatal care is its unitary focus on the individual patient, assessing her needs and providing interventions to reduce the risk of pregnancy to mother and infant. The success of regional perinatal care depends totally on the strength of the partnership that has created the network. In the establishment of regional systems, providers have shown a remarkable resolve to work together and to begin to address the problems that extend beyond their own institutions.

Directors of regional perinatal programs have contributed significantly to the reorganization and increased effectiveness of services to mothers, infants, children, and adolescents. The work of Davidson (19) and Merkatz (20) are but two examples.

Regional perinatal care offers the best opportunity to begin to structure an organization of maternal and infant care that will initiate the complex interplay of social, medical, and environmental factors that determine the outcomes of pregnancy and early life and that will start to close the gap between the "haves" and the "have nots."

I have presented regional perinatal care as a strategy that holds enormous promise for the optimal provision of services to mothers and infants. As a strategy, it surely is a level 3—looking for results of diminished mortality and morbidity in an entire region that transcend the narrow objective of individual providers and institutions. We have few such tertiary-level strategies that have any chance of success.

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Effects of Sociodemographic and Attitudinal Factors on Mother-Initiated Medication Behavior for Children

LOIS A. MAIMAN, PhD
MARSHALL H. BECKER, PhD, MPH
K. MICHAEL CUMMINGS, PhD
ROBERT H. DRACHMAN, MD
PATRICIA A. O'CONNOR, MD

DESPITE THE MULTIPLICITY of nonprescription drugs available in the United States—estimates range from 100,000 to 500,000 proprietary products (1-3); the magnitude of annual expenditures by the population for such products—estimated at \$3 billion (4,5); and the many millions of dollars spent each year to persuade people to use such drugs for minor health problems, few studies have been made of the use of over-the-counter (OTC) medications (in the absence of professional recommendations) to try to prevent or relieve illness. In view of the likely importance of information about people's self-initiated medication treatment and exposure to nonprescription medicines—for example, to policymakers, to health care providers planning effective medical care interventions, and to behavioral

scientists attempting to understand and modify health-related behaviors—it is surprising that data are scarce concerning the nature, extent, and determinants of self-medication (6-11).

The need for such knowledge is particularly acute with regard to mothers' medication behaviors initiated on behalf of their children. In any pediatric medical setting one hears many anecdotes about unusual remedies employed by parents and about the untoward outcomes of parental ministrations to ward off or cure real or imagined conditions in their children. However, no systematic evidence is available concerning the kinds of remedies generally employed, for what conditions, and by what "kinds" (sociodemographically and psychosocially) of parents.

Only a few investigations have specifically addressed parent-initiated medication use for children; two were conducted in the United Kingdom (6,7) and a third in Monroe County, N.Y. (8). In a British study (6), parents reported that during the 4-week period before interview approximately two-thirds of the children had taken nonprescribed medicines and 18 percent had taken prescribed medicines. Perhaps the most detailed study of use of medication for children is a survey of British households conducted by Dunnell and Cartwright. (7). During the 2-week recall period before interview, 55 percent of the children had taken medication, 48 percent had received nonprescribed medication, and 20 percent had received prescribed medication. Finally, in a community survey by Haggerty and Roghmann (8), although 40 percent of the children

Dr. Maiman is assistant professor, Department of Pediatrics, School of Medicine and Dentistry, University of Rochester. Dr. Becker is professor, Department of Health Behavior and Health Education, School of Public Health, University of Michigan. Dr. Cummings is research scientist, Department of Cancer Control and Epidemiology, Roswell Park Memorial Institute. Dr. Drachman is associate professor, Department of Pediatrics, School of Medicine, Johns Hopkins University. Dr. O'Connor is associate professor, Department of Pediatrics and Communicable Diseases, University Hospital, University of Michigan.

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studied had ingested some type of medication, for approximately 25 percent of the sample the treatment had been introduced by their mothers or other responsible family members.

In summary, data from these studies yield similar findings with regard to (a) the proportion of children undergoing such therapy, with relative increases for the different recall periods employed by the researchers (22 percent of the children received medication selected by parents during a 24-hour period (8), 28 percent during a 2-week period (7), and 66 percent during a 4-week period (6)) and (b) the types of drugs most frequently used by parents (vitamins, pain relievers, cough and cold medicines, and skin ointments and antiseptics). Moreover, findings concerning the relationship between use of parent-initiated medication and physician consultation are mixed. In the two studies conducted in England (6,7), parent-initiated treatment was found to supplement taking the child to a physician; when the number of reported illnesses was held constant, a positive correlation was seen between medical consultations and number of nonprescribed medications taken by children. However, research undertaken in the United States (8) seems to indicate that the use of nonprescription medications functions as an alternative to obtaining medical care for the child. In any event, all of these studies of parent-selected treatments focused on randomly selected variables rather than employing a systematic conceptual approach to identifying various social or psychological

forces that might influence these decision-making processes.

The major objectives of our research were (a) to describe mothers' independent decisions to use available treatments (that is, OTC medications, leftover prescription medicines, and home remedies) in attempting to deal with health problems they believe their children have and (b) to attempt to better understand the mother-initiated medication behavior process by exploring its associations with mothers' sociodemographic characteristics and their opinions or perceptions regarding their children's health, the efficacy and safety of OTC and prescription drugs, and sources of information and advice about medications.

Methods

Subjects and data collection. The study was conducted in three pediatric ambulatory care clinics located in (a) a large teaching hospital on the east coast, (b) a teaching hospital in a medium-size city in the Midwest, and (c) a large group practice in a major Midwest city. These locations were selected to assure major among-site differences in the sociodemographic characteristics of the respondents.

Mothers whose children were experiencing health problems were not included, since the existence of these conditions and their concomitant treatment might bias the reporting of usual mother-initiated medication behavior. Lower and upper age limits for the children were set at 6 months and 12 years, respectively, because (a) in children younger than 6 months symp-

toms of illness are relatively infrequent, and we wished to capitalize on situations where the mother would have had many opportunities to engage in treating her child, (b) in general, mothers may be relatively less willing to risk making decisions about medications and other treatment for their very young children, and (c) children over age 12 may participate more extensively in decisions about their care when ill, and such involvement would confound interpretation of the data.

During a 6-month period, stratified, systematic random samples of 100 mothers of children 6 months to 12 years old who presented for well child visits at each of the 3 study clinics were interviewed (total of 300 mothers). Each interview, lasting about 30 minutes, concerned mothers' use of medications and medical appliances for their children, their beliefs, worries, and motives related to their children's health, and their opinions about different kinds of medicines. Each respondent was directed to answer all questions in terms of the child scheduled for the well child visit (the "index child"). Family sociodemographic data also were obtained.

Sampling fractions to permit stratification were calculated and used to reflect differences in the total volume of well child visits per month at each site and the proportion of children in each age stratum identified for study—6–11 months, 1–4 years, 5–9 years, and 10–12 years. For 2 sites, the east coast teaching hospital and the Midwest teaching hospital, all 200 eligible subjects participated in the study. At the Midwest group practice, 5 subjects refused to participate, necessitating the selection of 105 mothers to obtain 100 respondents (a total response rate of 98 percent).

Measurement of dependent variables. To measure "types of medications kept in the house for use when the child becomes ill," 2 questions were used: the first was open ended, and the second listed 15 categories or "types" of medications (the latter permitted questioning the mother about categories not previously volunteered). Scores were summed for each mother across the 2 questions and ranged from 0 to 15. "Medical appliances kept in the house for use when the child becomes ill" was assessed by each mother's selection from a list of 7 medical appliances; scores ranged from 0 to 7. We prepared both lists in consultation with experts in pediatrics to ensure coverage of the types of medications and medical appliances likely to be used in mother-initiated treatment.

Measurement of independent variables. Independent variables included mothers' concerns about their children's health and medication-related attitudes. Many

of the opinion statements employed were adapted from previous studies of mothers' perceptions of their children's vulnerability to illness (in general, and with regard to each of 12 acute pediatric health problems), orientations toward medical information and medical care, and subjective estimates of ability to control life events through personal actions (12,13). Health problems included in the list paralleled the types of medications and appliances enumerated in the dependent variables. To reflect medication-related attitudes, we constructed statements to measure mothers' beliefs about efficacy and safety of prescription and OTC medications, propensity toward self-medication, and usefulness of sources of information about OTCs. Respondents indicated their levels of agreement or disagreement with these statements along a 5-point Likert-type scale from "strongly agree" to "strongly disagree." Estimates of children's "vulnerability" to each health problem were tapped by mothers' responses along a 7-point unidimensional scale from "no chance will get it" to "almost certain to get it."

"Sociodemographic characteristics" measured included mother's age, race, number of children, education, and total annual family income. Mothers' ages ranged from 17 to 55; the number of children ranged from 1 to 7. Of the 300 mothers, 175 (58 percent) were white, and 125 (42 percent) were non-white. Mothers' education (highest grade completed) ranged from sixth grade to graduate school. Total family income was reported in 8 response categories, from 1 (under \$5,000) to 8 (\$30,000 or more).

Index of socioeconomic status. An index of socioeconomic status (SES) was constructed for each mother based on two variables, education and total annual family income. Calculation of the SES index required two steps for both variables. First, education was categorized into 3 levels (11th grade or less, 12th grade, and beyond high school), and total income was categorized into 4 levels (under \$7,999, \$8,000–\$14,999, \$15,000–\$19,999, and \$20,000 or more). Second, each mother was assigned a composite SES score (1 = low, 2 = middle, 3 = high) based on position in the combined variable matrix; this procedure resulted in a stronger weighting of education in relation to income.

Analysis techniques. Chi-squares of percentages on medications and medical appliances were used to test for study site differences in possession of individual and total numbers of medications and appliances. Mean response on perceived vulnerability of the child to health problems were evaluated relative to study site by computation of 1-way analyses of variance (*F*

Table 1. Sociodemographic characteristics of mothers interviewed at three study sites

Sociodemographic characteristics	East coast teaching hospital	Midwest teaching hospital	Midwest group practice
Average age (years)	26.0	29.4	32.6
	Percent		
Nonwhite	99.0	23.3	2.9
Family income:			
Less than \$8,000	43.8	20.2	2.1
\$8,000-\$14,999	25.9	25.3	4.3
\$15,000-\$19,999	15.7	19.2	18.1
\$20,000 or more	14.6	35.3	75.5
Education:			
Less than high school	51.0	7.1	0.0
High school	39.0	18.2	17.8
More than high school	10.0	74.7	82.2
Number of children:			
1	38.4	35.0	24.5
2	29.3	38.0	50.0
3	15.2	19.0	17.6
4 or more	17.1	8.0	7.9

ratio); this technique also was used to test mean responses to attitude questions by socioeconomic status. Correlations (gammas) were obtained between health- and medication-related attitudes of mothers and numbers of various medications and appliances possessed.

Results

Some differences in sociodemographic characteristics of mothers interviewed at each study site are shown in table 1. Almost all respondents at the east coast teach-

ing hospital were black; at the Midwest teaching hospital, 23 percent were nonwhite (70 percent of these were black); and at the Midwest group practice, only about 3 percent were nonwhite.

In all the tables, findings for each study site are arranged in order of increasing income and education of mother to illustrate more clearly the influences of these factors on mother-initiated medication behavior. As shown in table 1, 44 percent of the mothers at the east coast hospital, 20 percent at the Midwest hospital, and only 12 percent at the group practice were in the income category "less than \$8,000." Similarly, although more than half of the respondents at the east coast hospital had less than a full high school education, only 7 percent of those at the Midwest hospital did not hold a high school degree; however, at the group practice site, all the mothers were high school graduates—in fact, a large majority of these mothers reported 1 or more years of formal education beyond high school. Based on findings for family income and education of mothers, a socioeconomic status categorization for each site identified the east coast hospital site as a low SES clinic, the Midwest hospital as a middle SES clinic, and the group practice as a high SES clinic. Finally, approximately 75 percent of the mothers at the Midwest hospital and the group practice had 1 to 2 children, compared to 68 percent at the east coast hospital. At the east coast site, the mothers were twice as likely as mothers at the other 2 sites to have 4 or more children (17 percent at the east coast hospital as opposed to 8 percent each at the Midwest hospital and the group practice).

A comparison of the sites (table 2) shows that

Table 2. Percentage of mothers who keep each medication in house for when child becomes ill, by study site

Medications	East coast teaching hospital	Midwest teaching hospital	Midwest group practice	Significance of χ^2 $p < .05$
Antacids	28.7	31.0	45.1	S
Vitamins	61.6	71.0	84.0	S
Cold remedies	51.5	40.0	58.2	S
Constipation remedies	66.7	29.5	22.0	S
Fever remedies	99.0	94.0	100.0	NS
Pain remedies	16.3	24.2	42.0	S
Diarrhea remedies	45.5	36.0	28.3	S
Cough remedies	83.8	53.0	79.2	S
Sneeze or allergy remedies	27.3	22.0	37.6	S
Weight control	7.1	1.0	2.0	S
Remedies for infected cuts or bruises (including antibiotic ointments)	24.3	48.5	87.3	S
Remedies for skin problems (for example, rash or athlete's foot)	40.0	34.3	66.3	S
Sleep inducers	3.0	4.0	6.9	NS
Tension reducers	2.0	6.1	5.9	NS

NOTE: S Indicates significant; NS indicates not significant.

mothers at the group practice were most likely to possess the medication in 8 of the 14 categories listed; however, this was true for only 4 types of medication at the east coast site (constipation, diarrhea, cough, and weight remedies), and only once for the mothers at the clinic whose SES was between the extremes (that is, mothers at the Midwest hospital, who led slightly in possession of "tension reducers"). It is also apparent that with increasing levels of education and income, possession of antacids, vitamins, pain remedies, and remedies for infected cuts or bruises increases, but use of medications for constipation, diarrhea, and weight control decreases. For some medications, the relationship of SES to use was significant but curvilinear (that is, higher levels of use were observed in the lowest and highest SES clinics); this was true for remedies for colds, coughs, sneezing or allergies, and skin problems (for example, a rash or athlete's foot).

Overall, mothers at higher income and education levels were relatively more likely to possess for their children medications such as antacids, vitamins, antibiotic ointments, and remedies for pain, allergy, and skin conditions. With relatively lower SES, mothers were more likely to have medications for constipation, diarrhea, cough, and weight reduction. (Several of our pediatric consultants noted that some mothers occasionally used OTC weight reduction medications for their children, and therefore we included this category in our interview. Our assumption is that mothers who keep such medications on hand do so because they have used them previously to help their children lose weight.) Almost all of the mothers stocked medicines for reducing fever, but few used medications for in-

Table 3. Percentage of mothers who keep each medical appliance in house for when child becomes ill, by study site

Medical appliance	East coast teaching hospital	Midwest teaching hospital	Midwest group practice	Significance of χ^2 $P < .05$
Fever thermometer ..	84.0	93.0	100.0	S
Vaporizer	55.0	64.0	80.2	S
Scale	43.0	47.0	88.1	S
Heating pad	32.0	51.0	69.3	S
Enema bag	27.0	18.0	14.9	S
Ice bag	33.3	18.2	12.7	S

NOTE: S indicates significant.

ducing sleep or for reducing tension. In only 3 instances (vitamins, fever remedies, and cough medicine) did more than 50 percent of the mothers at all the study sites indicate possession of the medications.

Table 3 applies the same approach to presentation of study findings concerning mothers' use of various medical appliances. Here, the SES trends are especially clear; likelihood of ownership of a fever thermometer, vaporizer, bathroom scale, and heating pad increased with increased income and education. However, mothers at the lower SES site (east coast hospital) were more likely to own an enema bag (paralleling their much higher possession of constipation remedies, reported earlier) and to own an ice bag. Of the six appliances listed, a majority of mothers at the group practice owned four; that figure declined to three at the Midwest hospital, and to two at the east coast clinic.

In attempting to account for mothers' differential possession of various types of medication for their

Table 4. Mean scores, standard deviations, and 1-way analysis of variance of mothers' perceived vulnerability of child to selected health problems, by study site

Health problem	East coast teaching hospital			Midwest teaching hospital			Midwest group practice			F ratio	Rank concordance with "have medication in house"
	Score	SD	Rank	Score	SD	Rank	Score	SD	Rank		
Diarrhea	2.68	1.99	1	2.53	1.53	2	2.56	1.58	3	.21	No
Constipation	2.94	1.39	1	2.57	1.39	2	2.20	1.65	3	¹ 2.69	Yes
Cough for 2 days	4.62	1.95	1	3.50	1.69	3	4.37	1.67	2	¹ 11.50	Yes
Scratch on arm or leg (infection)	5.23	2.09	3	5.44	2.07	2	5.78	1.42	1	2.07	Yes
Mild skin rash	3.09	2.31	2	2.69	1.90	3	3.37	1.87	1	¹ 4.04	Yes
Fever of 101°	3.58	2.24	2	3.48	1.84	3	4.08	1.68	1	¹ 3.07	Yes
Trouble getting to sleep	2.37	2.31	3	2.78	2.03	2	3.18	1.91	1	¹ 2.81	Yes
Pain:											
Toothache	2.16	1.90	3	2.29	1.99	2	2.50	2.05	1	.77	Yes
Belly pain	3.10	2.10	3	2.54	1.61	2	3.44	1.71	1	¹ 5.94	No
Sore throat	3.67	2.04	3	3.73	1.62	2	4.12	1.60	1	2.06	Yes

¹ Significant at $< .05$.

NOTE: The higher the mean score the more vulnerable the mother perceives her child to be to the health problem. Ranks represent the ordering

(from table 2) of the study sites in relative percentages of mothers who keep the relevant medication in house for when child gets sick; 1 = highest percentage.

Table 5. Percentage of mothers keeping different numbers of medications and medical appliances in house for when child becomes ill, by study site

Quantity categories	East coast teaching hospital	Midwest teaching hospital	Midwest group practice
Different medications: ¹			
0-3	14.0	22.0	7.6
4-8	66.0	68.0	64.8
9-15	20.0	10.0	27.6
Different appliances: ²			
0-2	37.0	28.0	9.5
3-4	42.0	52.0	49.5
5-7	21.0	20.0	41.0

¹ $P < .05$ by χ^2 .

² $P < .01$ by χ^2 .

children, we explored the concept of "vulnerability to illness," a variable found in most models of health-related decision making (14). Mothers were asked to estimate, on a 7-point scale (from 1 = no chance, to 7 = almost certain), the chance that their child might experience each of 10 health conditions. We hypothesized that increased levels of perceived vulnerability to a condition would be related to increased likelihood of keeping medicines handy for that condition.

Findings relevant to testing that hypothesis appear in table 4, which presents mean "perceived vulnerability" scores for each health problem along with each study site's ranking (relative to the other sites) with regard to extent of mothers' possession of medication for that particular condition (data from table 2), and results of the 1-way analysis of variance by site. The last column in table 4 shows agreement between ordering for perceived vulnerability and ordering for possession of medication for that condition.

As was the case with possession of medications, mothers at the three study sites differed with respect to their estimates of their children's vulnerability to particular health problems. Thus, respondents at the lower end of the SES spectrum (east coast hospital) expressed the most concern about diarrhea, constipation, and a cough for 2 days, while mothers at higher SES levels saw their children as more susceptible to fever, scratches and skin rashes, problems with sleeping, and pain of various kinds (indeed, mothers at the group practice provided the highest vulnerability scores in 7 of the 10 conditions presented, as contrasted with 3 of 10 for mothers at the east coast hospital.) One-way analyses of variance yield statistically significant differences across study sites for 6 of the 10 health problems, including 2 of the primary concerns of the east coast hospital mothers (constipation and cough for 2 days) and 4 of the primary concerns of the group practice mothers (mild skin rash, fever of 101°, trouble getting to sleep, and belly pain). Perhaps most important, however, was the concordance between rankings of level of perceived vulnerability and possession of medication for that condition: perfect concordance was obtained in 8 of the 10 cases, suggesting that some portion of mother-initiated medication behavior is indeed related to the mothers' perceptions about their children's susceptibility to different health threats.

In addition to specific categories of mother-initiated medication behavior, we examined variation in the number of different medications mothers reported keeping for their children. The data in table 5 show significant differences by study site for both numbers of medications and numbers of appliances. Although the middle-range quantity categories were most common across all clinics, in the highest categories (9-15

Table 6. Correlations (gammas) between number of different medications and medical appliances kept in house and mothers' perceptions of children's vulnerability to various health problems

Health problem	Number of medications	Significance $P < .05$	Number of appliances	Significance $P < .05$
Sore throat	.161	S	.182	S
Throwing up	.154	S	.040	NS
Diarrhea	.256	S	.062	NS
Scratch or cut (infection)	.026	NS	.110	NS
Sneezing (allergy)	.176	S	.057	NS
Constipation	.217	S	.144	S
Mild skin rash	.316	S	.191	S
Cough for 2 days	.233	S	.044	NS
Fever of 101°	.164	S	.117	S
Sleep problems	.180	S	.081	NS
Toothache	.191	S	.110	NS
Belly pain	.202	S	.206	S

NOTE: S Indicates significant; NS indicates not significant.

Table 7. Correlations (gammas) between number of different medications and medical appliances kept in house and various health-related attitudes of mothers

Attitude statement	Number of medications	Significance $P < .05$	Number of appliances	Significance $P < .05$
Family is very often troubled by sickness	.197	S	.046	NS
I try to keep lots of medicines at home in case (child) needs them	.200	S	.046	NS
Events usually take their own course no matter what you do . . .	.165	S	.220	S
I usually trust my own opinions about (child's) health more than a MD's	.247	S	.271	S
You have to use your own judgment in deciding how much of a MD's advice to follow	.285	S	.157	S
I have been very satisfied with prescription medicines I've given (child)	-.207	S	-.036	NS
I can be less careful when I give (child) an OTC medicine than prescription medicine	.198	S	.160	S
I sometimes give (child) OTCs in addition to those prescribed by MD for a problem	.197	S	.006	NS
When I get sick, I try things at home for a few days before seeing MD	.199	S	.102	NS
When I get sick, an OTC medicine often works just as well as prescription medicine	.171	S	.005	NS

NOTE: S Indicates significant; NS Indicates not significant; OTC indicates over the counter.

for medications, 5-7 for appliances) the mothers in the group practice reported substantially higher percentages, suggesting that affluence probably accounts for much of the ability to possess the greatest variety of remedies.

Since mothers' perceptions of their children's potential vulnerability to illnesses were related to possession of medications and appliances on a category-by-category, site-by-site basis, it seemed worthwhile to examine correlations between perceived susceptibility to each problem and total numbers of different medications and appliances across all study locations. The results reported in table 6 indicate that, with the exception of "scratch or cut," each perceived vulnerability item was significantly correlated with the number of different medications kept on hand for the child; however, similar correlations relating perceptions and number of appliances were statistically significant in only 5 of the 12 conditions listed (sore throat, constipation, rash, fever, and belly pain).

We also looked for possible relationships between mothers' medication-related attitudes and the number of medications and medical appliances kept at home for their children. These correlations, presented in table 7, were all significant for numbers of different medications (the strongest associations related to the mother's faith in her ability to decide what therapy her child requires when ill); however, only 4 of the 10 attitude items were significantly associated with

ownership of medical appliances (the strongest correlation again being in the area of reliance on personal judgment). In general, the mother who keeps more kinds of medications available for her child views her family as often troubled by sickness and states that she tries to keep lots of medications at home in case her child gets sick. She is somewhat fatalistic, tends to trust her opinions about her child's health more than the opinions of the physician, and is less satisfied than her peers with prescription medicines she has given to her child in the past. The higher-medication mother also feels that she can afford to be less careful when giving OTC medications to her child than she has to be when she gives the child prescription medicines, and sometimes she adds OTCs to the course of therapy prescribed by the doctor. Finally, when the mother herself is ill, she is relatively more likely to try things on her own for a few days to see if she can avoid a physician visit and feels that for herself OTCs are just as good as prescription medicines.

Findings presented to this point have highlighted links between mothers' SES and study clinic site; between clinic site and mothers' possession of different medications for their children; and between medication use and a variety of attitudes. We also explored possible relationships between mothers' medication-related attitudes and SES. The relevant data from 1-way analysis of variance by SES for mean attitude scores are presented in table 8. To produce a more sensitive

and precise assessment of SES, the 3-category index of SES employed was based on a combination of mothers' reports of total family income and the highest grade she had completed in school. (It should be noted that the lower the mean score, the greater the degree of agreement with the attitude statement.)

Mothers with relatively lower SES are more likely to exhibit a fatalistic attitude toward life events (that is, a tendency toward external locus of control), to perceive their children as susceptible to frequent illnesses, particularly of the kinds "that doctors can't do much for," and to worry about their children getting sick. While, surprisingly, these mothers believe that most of their children's illnesses cannot be treated successfully with OTCs, they nonetheless try to keep a large supply of medications at home in case they (or their children) need them and include leftover prescription medicines in their supply. Also associated with reduced levels of education and income is a more skeptical attitude toward physicians. Although the 1-way analysis of variance produces a significant SES effect for

only one of the attitude statements, these mothers tend to rely more heavily on their own judgments about their children's health and the treatments they might require and are less hesitant to add OTCs to the medications prescribed by the physician for the child.

Finally, lower SES mothers are generally less concerned about giving their children OTC (as opposed to prescription) medicines, viewing OTCs as less likely to cause the children to experience side effects, and they more frequently consult druggists for advice concerning the selection of OTCs for their children. In addition, these mothers believe that they do not learn much about OTCs by reading the medications' labels and are less likely to realize that some medicines decline in strength after long periods.

Discussion

These analyses indicate that income and education levels are related to which types or categories of medications and medical appliances mothers keep available to treat various health problems of their children.

Table 8. Mean scores, standard deviations, and 1-way analysis of variance of mothers' responses to attitude statements, by socioeconomic status

Attitude statement	Socioeconomic status						F ratio
	Low		Middle		High		
	Score	SD	Score	SD	Score	SD	
Events usually take their own course no matter what you do . .	2.53	1.54	2.96	1.36	3.67	1.26	¹ 15.40
(Child) gets sick fairly often	3.34	1.59	3.93	1.36	4.25	1.10	¹ 10.04
(Child) gets kind of illnesses MDs can't do much for	3.80	1.56	3.84	1.36	4.22	1.15	¹ 3.43
I worry that (child) will get sick	2.44	1.36	2.96	1.52	3.46	1.38	¹ 11.44
Most of (child's) illnesses can be taken care of with OTCs . . .	3.70	1.44	3.26	1.36	2.98	1.35	¹ 5.57
I try to keep lots of medicines at home in case (child) needs them	3.18	1.70	3.92	1.32	4.58	1.17	¹ 8.83
I try to keep lots of medicines at home in case I need them . . .	3.61	1.52	4.06	1.28	4.24	1.06	¹ 5.22
I save leftover prescription medicines in case someone in family gets same problem	3.05	1.07	4.17	1.38	4.24	1.26	¹ 8.35
I usually trust my own opinions about (child's) health more than a MD's	3.51	1.59	3.58	1.41	3.80	1.11	1.64
You have to use your own judgment in deciding how much of a MD's advice to follow	2.89	1.56	2.96	1.38	3.29	1.42	.81
I sometimes give (child) OTCs in addition to those prescribed by the MD	3.66	1.55	4.14	1.26	4.42	1.09	¹ 7.54
I often ask druggist what OTC medicines I should give (child) for a problem	3.04	1.67	3.40	1.53	3.66	1.39	¹ 3.63
I'm more worried when I give (child) prescription medicine than OTC medicine	3.91	1.35	3.98	1.33	4.26	1.02	2.50
(Child) less likely to get side effects from OTCs than from prescription medicines	3.25	1.53	3.59	1.41	3.73	1.05	¹ 2.85
I don't learn much about OTC medicines from reading the information on the label	2.09	1.75	3.06	1.43	3.12	1.43	¹ 7.87
Some medicines lose strength after a long time	1.89	1.33	1.90	1.28	1.34	0.70	¹ 8.95

¹ Significant at < .05.

NOTE: The lower the score, the greater the mother's agreement with the statement.

Mothers with higher levels of income and education were more likely to have antacids, vitamins, antibiotic ointments, and remedies for pain, allergy, and skin problems available for their children, while those with lower income and less education more frequently reported possession of constipation, diarrhea, and cough remedies, as well as medicines for weight control. A similar variation by income and education level was observed for medical appliances; higher income and education were associated with ownership of fever thermometers, vaporizers, bathroom scales, and heating pads, while lower SES mothers were more likely to have enema bags and ice bags available for their children. With regard to the quantity of medications and appliances kept in the home for the children, SES appears to influence how many remedies (and especially how many medical appliances) will be purchased. In multiple regression, the principal component of SES that accounted for number of medications was education while the principal component of SES that accounted for number of appliances was income.

Findings from this project are generally consistent with those of the few studies that have focused on the types of medications most frequently employed in parent-initiated treatments for children (6,8), including the relationship observed between income and education levels and the number of nonprescribed medications used (6). However, our findings provide additional and unique information in demonstrating the relationships between mothers' attitudes concerning both their children's health and medications and various aspects of mother-initiated medication behavior.

Mothers' perceptions of their children's potential susceptibility to various health problems were shown to be related to possessing what they believe are relevant remedies for those problems (as well as to keeping a greater number of different medications on hand for their children). Specific attitudes held by mothers about medications also contribute to explaining the quantity of remedies kept available for their children if they become ill. The strongest associations show that the mother who keeps a greater number of various medications on hand relies more on her own judgment concerning therapies for her child and trusts her own opinions about her child's health more than those of the physician. In addition, she expresses dissatisfaction with her experience in administering prescribed medications to her child and tends to keep a lot of medications at home in case her child gets sick. Other belief dimensions found to be significantly associated with possession of a greater number of medications include the mother's perceiving her family as being more frequently troubled by sickness, regarding OTCs as re-

quiring less care than prescribed medications in administration to the child, feeling less able to control events by personal intervention, and relying on self-care and OTCs to manage her own illnesses. Finally, mothers' medication-related attitudes were highly correlated with SES.

The clinical implications of the present research can be viewed in terms of the need for health professionals to become more aware of the medications their pediatric patients may be ingesting as a result of mother-initiated therapies. Clearly, mothers in different SES groups are concerned about the health problems their children might have and are more or less likely to use various types of nonprescribed treatment before (or instead of) seeking medical assistance. The data also provide some useful information for explaining variations in mother-initiated medication behavior, in the form of relationships between medication-related attitudes and the type and extent of use of OTCs.

In view of our results, we recommend that pediatricians and other health care providers consider the substantial and disparate use of medications by mothers without medical advice so that these matters might be routinely reviewed with each mother. It would be appropriate to elicit the types of medications the mother keeps on hand for her child and the conditions for which they are used. The findings from such a mother-initiated medication history would guide the clinician in deciding the content of an educational intervention that provides special advice concerning the use and misuse of such medications. In addition to assessment of possession and use of medications, the mother's attitudes concerning her child's health and use of medications might be addressed formally, with questions paralleling the dimensions employed in this investigation. The practitioner should also consider the influence of SES on medication-related attitudes and behaviors when questioning the mother about types and extent of her self-initiated medication behavior.

Although the present research may have confirmed long-held suspicions of clinicians concerning mothers' use of medications for children in the absence of medical advice, it should be noted that a qualitative assessment of mother-initiated medication use is not provided by the study. Consequently, no determination can be made of whether the therapies undertaken are helpful or harmful to the children or of the effect of sociodemographic and attitudinal factors on the quality of mother-initiated medication treatments. We hope that the results of this study will provide a basis for (and stimulus to) further research directed toward determining the extent of appropriate and inappropriate mother-initiated medication use.

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SYNOPSIS

MAIMAN LOIS A. (School of Medicine and Dentistry, University of Rochester), BECKER, MARSHALL H., CUMMINGS, K. MICHAEL, DRACHMAN, ROBERT H., and O'CONNOR, PATRICIA A.: *Effects of sociodemographic and attitudinal factors on mother-initiated medication behavior for children. Public Health Reports, Vol. 97, March-April 1982, pp. 140-149.*

Little is known about the therapies that people initiate for their health problems, and the available research on self-medication has focused primarily on adult populations. Only a few studies have specifically addressed mothers' independent use of medications for their children, and

none has described such behavior in depth (for example, relating such behaviors to specific mother-perceived symptoms and conditions in the child or attempting to provide an explanation for mothers' decisions in these situations).

A stratified systematic random sample of 100 mothers of children between 6 months and 12 years old was obtained at each of 3 pediatric ambulatory care clinics. Mothers were interviewed about their use of medications for their children, their concerns about their children's health, and their medication-related attitudes. The study results suggest that income and education are related to the types of medications and medical appliances mothers keep to treat the

various health problems of their children. Mothers' perceptions of their children's potential susceptibility to health problems are related to possession of what they believe are relevant remedies for those problems (as well as to keeping a greater variety of medications on hand). Socioeconomic status appears to be one determinant of the number of different remedies (and especially the number of different medical appliances) that are purchased. Certain attitudes held by mothers about medications also play a role in explaining how great a variety of remedies are kept available for children in the event that they become ill, and these medication-related attitudes are highly correlated with socioeconomic status.

The Ohio Cancer Information Service: Callers, Inquiries, and Responses

NANCY A. REICHES, PhD
NANCY KESSELRING BRANT, MA

THE CANCER INFORMATION SERVICE (CIS) is a toll-free telephone system consisting of regional offices that operate under the sponsorship of major cancer centers across the United States (1). The services are funded by the National Cancer Institute and often co-sponsored by the American Cancer Society and other organizations. About 65 percent of the nation's population are served directly by a regional CIS. The National Cancer Institute operates a CIS for areas not served by a regional CIS and as a backup for the local CIS.

The telephone has long been recognized by various counseling and crisis intervention organizations as a powerful tool for communicating with the public (2,3). The CIS employs this approach by encouraging the public to use the service for primarily informational purposes. The service provides a private, anonymous medium by which people can obtain answers to personal or general questions about cancer.

The Ohio Cancer Information Service

The Ohio Cancer Information Service (OCIS) is the regional service for the State, which has a population of about 11 million. The OCIS is a program of the Ohio State University Comprehensive Cancer Center in Columbus. An integral part of the communications program of this university center, the OCIS uses its resources as well as those of the National Cancer Institute. Oncologists, nurses, and allied professionals from clinical and community programs

serve on the OCIS advisory committee. Many of these professionals also are available for consultations with OCIS telephone operators.

The purpose of the service is to give the public rapid and easy access to up-to-date, easily understood information about cancer. An important objective of the OCIS is to reduce people's fears of cancer by providing information that helps them understand and cope with the disease. The program not only includes educational information about prevention, early detection, and the value of early intervention—with the hope of enhancing personal health behaviors—but it also provides complete and accurate updates on recent advances in cancer etiology, diagnosis, and treatment. In addition, the OCIS is a resource for local cancer programs and a contact for information about basic and clinical research in cancer. The OCIS serves as a clearinghouse for health professionals seeking information about investigational programs, basic research, educational materials and programs, and services for their patients. The objectives of the OCIS are consistent with the program goals specified by the National Cancer Institute (4).

In addition to providing telephone assistance, the OCIS mails, free-of-charge, printed materials on topics such as symptoms, early detection through self-examination, treatment for specific cancer sites, and dietary information for patients receiving cancer therapy. All publications are produced by recognized cancer organizations such as the National Cancer Institute, the American Cancer Society, and other comprehensive cancer centers.

Answers to all inquiries are taken from materials provided by the National Cancer Institute or those prepared by OCIS staff and approved by the univer-

Dr. Reiches is a research scientist, Epidemiology and Biostatistics Unit, and Ms. Brant is the communications director, Ohio Cancer Information Service, Comprehensive Cancer Center, Ohio State University, Preventive Medicine, Starling-Loving, 320 W. 10th Ave., Columbus, Ohio 43210. Tearsheet requests to Dr. Reiches.

sity center clinicians. Information on services and programs for cancer patients and their families in their own communities is also given to callers. The OCIS maintains data on agencies and institutions in all 88 Ohio counties and assists callers in gaining access to and using these resources.

The OCIS is staffed primarily by volunteers. A small professional staff (director, communications specialist, volunteer coordinator, administrative assistant, and part-time graphics artist) supervises the volunteers, prepares the informational materials, designs promotional materials, and provides overall administration for the program. The majority of calls (about 80 percent) are answered by volunteers, who are recruited from the university and Columbus communities and are screened carefully for ability as well as reliability. Many volunteers are students in nursing, pre-medicine, and allied health professions; others are retired professionals. The "average" OCIS volunteer is a woman, has a bachelor's degree or is working toward one, and is either in the 18-21 or the 40-55 age group.

The volunteers attend a 16-hour (4 hours for 4 days) formal orientation or complete a 5-week individualized training program. The training programs are intended to provide only a basis for further learning. They include clinical presentations and readings on symptoms and diagnoses of the most common cancer sites, the primary modes of cancer therapy, cancer epidemiology, and proper access to and use of OCIS materials. Many training sessions are conducted by university faculty. In addition, volunteers also role play practice calls; they begin their OCIS participation by listening to experienced staff and volunteers take calls. The volunteer coordinator

then assesses the volunteer's preparation and ability to handle calls independently, although there are continuous supervision, evaluation, and mandatory in-service training sessions.

To assure no misunderstanding by the caller, each caller is informed that the operator is not a physician and cannot attempt to suggest what is advisable in a particular patient's case.

The availability of the OCIS is publicized almost entirely through public service donations from radio and television stations and newspapers and distribution of pamphlets in local supermarkets, health fairs, conferences, and meetings. Miscellaneous promotional approaches have been used with varying degrees of success. For example, a month-long billboard campaign was conducted during August 1980, when thousands of Ohioans visited Columbus to attend the Ohio State Fair. In addition, the American Cancer Society refers callers to the OCIS. Volunteers in all of the society's county unit offices have been provided with information on the service and encouraged to use the service by officials of the Ohio Division of the American Cancer Society. During the first year, 22 percent of all the referrals to the OCIS came from the units of the American Cancer Society.

Analysis of Calls to the OCIS

A Call Record Form was designed to collect a standardized set of data for each call received by the OCIS. The form is completed by the volunteer or staff member who handles the request. The data include various descriptors of the caller, the inquiry, and the response. For example, data collected on callers include sex, type of caller (cancer patient, relative, physician, general public, and others), location of caller

(State and county), and how the caller learned about the OCIS (newspaper, television, radio, American Cancer Society, and word of mouth). The subject matter of the call is assigned 1 of 42 subject codes, ranging from causes, symptoms, and treatment categories about patient care and available community resources. If the inquiry is related to a specific neoplasm, the anatomic site is coded. Additionally, it is noted if the caller requested referral to a physician. Information about the response includes whether the response was immediate or required a return call, letter, or the mailing of printed material. The source of information used in answering the question, either by telephone or by mail, is also recorded. Finally, general items are collected for administrative use and quality control. Among these items are the telephone answerer's identification number, time of day the call was received and terminated, and day of week.

The OCIS initiated service on July 16, 1979. By July 1980, 3,174 calls had been received. The number of calls per month ranged from 155 in December 1979 to 335 in April 1980. A large number of calls (303) was received in January 1980, following a major publicity effort. The calls were evenly distributed over the 5-day week of the service.

The types of callers are shown by sex in table 1. Although a significant proportion of callers (78 percent) were women ($P < .001$), there was no statistical difference between sexes in the distribution of types of callers. Overall, about 33 percent of all calls were from relatives or friends of cancer patients; only 13 percent were from patients themselves. These percentages parallel the national CIS experience (4).

The content of the inquiries varied according to types of callers. Table 2 shows the numbers of calls about selected subjects according to types of callers. The pattern formed by these data complies with

Table 1. Telephone calls to the Ohio Cancer Information Service, July 1979–July 1980, by type and sex of callers

Type of caller	Men		Women	
	Number	Percent	Number	Percent
Cancer patient	85	12.1	359	14.6
Relative or friend of patient	219	31.1	844	34.4
General public	258	36.6	762	31.0
Student	28	4.0	102	4.2
Physician, other professional	72	10.2	251	10.2
Other and unknown	43	6.1	139	5.7
Total	705	....	2,457	....

NOTE: Total number of calls received was 3,174, but sex was not coded for 12 callers.

what might be expected. For example, of the calls about the causes of cancer, only 12 percent were from patients, relatives, or friends, whereas 68 percent were from the general public ($P < .001$). As anticipated, patients and the people closely involved with them were more interested in treatment (80 percent of the calls in that category, $P < .001$) and community resources (50 percent of these calls, $P < .005$). By contrast, the general public made proportionately more inquiries about symptoms (63 percent) and diagnostic techniques (57 percent).

When the cancer site of interest was classified by type of caller, another interesting pattern emerged. Data for the six sites most commonly mentioned by the callers are shown in table 3. More calls regarding breast cancer (31 percent), compared with other sites, came directly from patients ($P < .01$). For the remaining sites, only 10 to 16 percent of the calls were from patients. On the other hand, only 26 percent of the calls about breast cancer were from relatives or friends, while 48 to 72 percent of the calls about neoplasms came from this group ($P < .005$). This dif-

Table 2. Subjects of telephone calls to Ohio Cancer Information Service, July 1979–July 1980, by type of caller

Type of caller	Causes		Community resources		Screening, diagnosis		Symptoms		Treatment	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Cancer patient	12	4.7	36	14.9	31	14.8	38	10.8	138	22.3
Relative or friend of patient	19	7.4	83	34.3	36	17.2	65	18.5	351	56.7
General public	175	68.1	48	19.8	119	56.9	221	62.8	52	8.4
Student	21	8.2	8	3.3	1	0.5	2	0.6	16	2.6
Physician, other professional	23	8.9	57	23.6	11	5.3	0	0.0	37	6.0
Other and unknown	7	2.7	10	4.1	11	5.3	26	7.4	25	4.0
Total	257	...	242	...	209	...	352	...	619	...

Table 3. Telephone calls to the Ohio Cancer Information Service, July 1979-July 1980, by type of caller and site or type of cancer of interest

Type of caller	Breast		Colon		Lung		Brain		Leukemia		Hodgkin's disease	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Cancer patient	119	31.1	20	16.4	26	13.5	8	12.5	7	10.6	10	16.7
Relative or friend of patient	99	25.8	58	47.5	113	58.5	46	71.9	40	60.6	36	60.0
General public	119	31.1	35	28.7	34	17.6	5	7.8	9	13.6	9	15.0
Student, professional	32	8.4	4	3.3	18	9.3	3	4.7	9	13.6	2	3.0
Other and unknown	14	3.7	5	4.1	2	1.0	2	3.1	1	1.5	3	5.0
Total	383	...	122	...	193	...	64	...	66	...	60	...

ference may reflect breast cancer patients' willingness or need to express themselves as well as their openness about their conditions. It also may reflect a growing general awareness about coping with the emotional impact of breast cancer resulting from recent autobiographical accounts in various media. Of the 383 calls about breast cancer, 37 (10 percent) were about diagnostic techniques, 55 (14 percent) about symptoms, and 81 (21 percent) about therapy. Only 16 (4 percent) of the calls concerned physical rehabilitation.

In general, the sites and subjects of the calls were consistent with the incidence of various neoplasms and with expected concerns in the community. The relatively large numbers of calls regarding causes, symptoms, and treatment is not surprising (table 4). Of the 619 calls about treatment, 80 callers were interested in the "best" treatment modality for a given disease. Only 19 questions concerned surgery, but 62 concerned radiation and 97 were about chemotherapy.

A large number of inquiries concerned unproved

methods (73 calls) and investigational techniques (90 calls). An additional 22 questions concerned lactrile. The large number of calls about the less conventional modes of therapy suggests that people feel more comfortable obtaining such information from an anonymous source rather than from persons associated with the traditional health care delivery system. It is also possible that many of these calls were prompted by the media coverage often given to so-called breakthroughs.

As shown in table 4, 454 (14.3 percent) of all the calls were for general cancer information, rather than a specific inquiry. The "other" classification includes small numbers of calls about such diverse topics as nutrition, rehabilitation, genetics, cancer myths, and employment problems of cancer patients. Only 20 calls (0.6 percent) were received about rehabilitation, and only 60 (1.9 percent) about smoking; however, some rehabilitation-related subjects may have been classified under requests for community resource information.

The distribution of site-related calls indicates that more calls were received about common rather than rare sites, as shown in table 5 for the 1,741 (55 percent) site-specific calls. In general, this distribution reflects cancer's overall site-specific incidence pattern (5). The largest percentage of calls concerned prevalent sites such as breast, lung, and digestive system. Breast cancer accounts for about 14 percent of all cancer incidence and about 27 percent of incidence among women. Since the majority of OCIS callers were women, it is not surprising that 22 percent of the site-specific calls pertained to breast cancer. About 11 percent of the calls concerned lung cancer, which represents about 15 percent of all malignancies in both sexes combined. The percentage of calls regarding colon-rectal disease (7.5 percent) was somewhat lower than its incidence, which is about 13 percent of all cancers. Most under-

Table 4. Telephone calls to the Ohio Cancer Information Service, July 1979-July 1980, by subjects of calls

Subject	Number	Percent
Causes	257	8.2
Symptoms	352	11.1
Diagnosis and screening	209	6.6
Treatment	619	19.6
Patient care	106	3.4
Community resources	242	7.6
Financial assistance	91	2.9
Statistics and survival data	79	2.5
Information about OCIS	99	3.1
General cancer information	454	14.3
Other	563	17.7
Unknown	103	3.2
Total	3,174	...

Table 5. Telephone calls to Ohio Cancer Information Service, July 1979–July 1980, by cancer sites named in inquiries

Site	Number	Percent ¹
Digestive system:		
Esophagus	22	1.3
Stomach	35	2.0
Colon	122	7.0
Rectum	9	0.5
Pancreas	35	2.0
Liver	51	2.9
Gallbladder	2	0.1
Urinary system:		
Bladder	36	2.1
Kidney	17	1.0
Other	3	0.2
Buccal cavity and pharynx	40	2.3
Respiratory system:		
Larynx	17	1.0
Lung, bronchus	194	11.1
Bone	55	3.0
Brain	64	3.7
Skin:		
Melanoma	32	1.8
Other	72	4.1
Thyroid	17	1.0
Male genital system:		
Prostate	50	2.9
Other	23	1.3
Breast	383	22.0
Female genital system:		
Cervix uteri	60	3.4
Corpus uteri	49	2.8
Ovaries	28	1.6
Other	15	0.9
Multiple myelomas	27	1.6
Leukemia	66	3.8
Lymphoma:		
Hodgkin's disease	60	3.4
Other	79	4.5

¹ Percentages are based on the total 1,741 calls that were site specific.

represented with respect to incidence were cancers of the prostate (2.9 percent of calls, 8.6 percent of incidence) and bladder (2.1 percent of calls, 4.6 percent of incidence). The liver was somewhat over-represented (2.9 percent of calls, 1.5 percent of incidence), but it is not known how many of these calls related to primary liver tumors. Since the liver is a common metastatic site, many of the 51 recorded calls may have actually pertained to secondary disease.

It also is important to evaluate the ways in which the OCIS is responding to caller inquiries. Although the satisfaction of the user population has not been

measured to date, several indirect indicators suggest that the questions are handled satisfactorily by the volunteers and staff.

In most instances, the caller received an immediate response—either a direct answer by telephone or assurance that appropriate printed material would be sent. It was necessary to call the person back for only 347 (11 percent) of the calls, an indication that volunteers and staff were sufficiently familiar with the response material and that proper materials were available in the OCIS office. Immediate responses were given for 1,210 (38.1 percent) calls; another 1,248 (39.7 percent) required only 1 to 3 minutes of additional time. Since the volume of calls was large, and is expected to increase, questions must be answered accurately with a minimum of research effort.

For each call, up to three sources of information used for telephone responses and up to three sources used for mail responses were coded on the Call Record Form. Of course, many calls required both types of response. Except for 60 calls referred to health professionals and 26 for which information was later obtained from the university's Health Sciences Library, all calls were handled by use of pamphlets and other materials in the OCIS office or directly by a staff member. Specifically, 407 requests were answered with source materials provided by the National Cancer Institute, and clinical fact sheets from the university's Comprehensive Cancer Center were read to callers in 165 instances. Thus, efforts to obtain a sufficient range of approved information were successful. Also, most requests (2,712) were answered by use of only 1 information source, 385 calls required 2 sources, and only 77 calls required 3.

Information was mailed to 1,333 callers—900 were sent 1 item, 370 were sent 2, and 63 were sent 3. The materials most frequently used were pamphlets from the National Cancer Institute (1,204) and the American Cancer Society (426). We believe that printed material from well-recognized sources assures high credibility of the information. If this is indeed so, information specifically related to health behavior (breast self-examination, for example) would positively influence the recipient's behavior; however, this speculation should be tested empirically by means of a survey of the OCIS user population.

The extent to which the public uses a cancer information service depends on the service's visibility in the community. Each caller was asked how he or she learned of the OCIS, and the various types of publicity were evaluated. No statistical differences between men and women were found for this variable. Overall, a significant proportion of the callers

(20.3 percent) read about the service in the newspapers, 11 percent saw a public service announcement on television, and 22 percent were referred by the American Cancer Society ($P < .001$). Other callers learned of the OCIS from a friend, a health professional, or through other small-scale publicity efforts.

Similarly, the ways by which callers learned of the OCIS did not differ significantly when classified by types of callers. This finding is somewhat surprising because members of the general public may not think to call until a newspaper or television item draws their attention to the service. By contrast, patients or their relatives may actually be seeking specific information services. Coupled with the finding that the general public made less specific inquiries (for example, general causes of cancer), we can speculate that exposure to OCIS publicity encourages people to ask questions that are of interest but not of immediacy to them. Thus, at least indirectly, the service seems to be achieving its goal of increasing public awareness of a source of information about cancer.

Conclusions

The findings about the OCIS user population and their interests parallel national CIS data and findings reported by a telephone tape service (Can-Dial) at another major cancer center (6). In all instances, the requests were relatively consistent with the incidence of various neoplasms in the population. The greatest difference in subject matter appeared in smoking-related inquiries—they were infrequent among OCIS callers. This difference in smoking inquiries may reflect basic differences in the types of services offered—Can-Dial was strictly a taped message service, whereas the OCIS responds directly to questions on a broader range of topics.

Beyond its provision of immediate and accurate answers to specific questions, it is difficult to assess the impact of the OCIS on the health behavior of callers and persons with whom they share information. Now that the service has been in operation for more than 1 year, evaluations in the form of retrospective surveys are being planned. First, it would be useful to assess how well persons are served by the community programs and institutions to which they are referred for assistance. Second, there is a need to examine the effect of the telephone and mail responses on a person's short- and long-term knowledge and behavior. Wilkinson and associates have presented some evidence that callers may already be more oriented to preventive measures than non-callers (7). Third, a demographic profile of the OCIS

users would be informative, since it has been demonstrated that socioeconomic variables are correlated positively with health behavior (8).

The analysis of calls to the OCIS must be tempered by the recognition that consumers of the service are a self-selected group and may not represent the total public. For example, Can-Dial users are reported to be younger, better educated, and more often married than a sample of noncallers (9).

However, the data obtained to date—if properly qualified—can be integrated into other cancer control and public education endeavors within the Comprehensive Cancer Center. The inquiries received by the OCIS help to highlight areas of community concern for which specific but broad-reaching programs can be designed and implemented. Although it will be some time before all the implications of this service (particularly with respect to behavior change) are known, the data describing the types of callers and inquiries form an encouraging pattern. That is, the service is used, at least partly, by persons with reasons to be interested in cancer, and the inquiries of these persons reflect legitimate and prevalent concerns about the symptoms, detection, and treatment of the disease. Our initial 13 months' experience with the OCIS reinforces the contention that an extensive service can be provided by means of a relatively inexpensive telephone network.

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Experience of the Checkerboard Area Health System in Planning for Rural Health Care

RICHARD A. REID, PhD
HOWARD L. SMITH, PhD

MANY HEALTH PLANNING MODELS created since the inception of the Hill-Burton program, comprehensive health planning, and health systems agencies have been concentrated on systems germane to urban settings. The urban bias of planning models has been fostered by the recent expansion of the health planning discipline, the urban location of health care facilities around which many of the first health plans were centered, and the large populations of many U.S. metropolitan regions. As a result of these trends, the planning of rural health care services has often been patterned on urban-based models, and the implicit premises of these models usually have been retained. For example, large inpatient organizations typically have represented the central ingredient in health facility planning—the aggregation of personnel, beds, and equipment provides a critical mass necessary for initiating and implementing planning activities as well as permitting economies of scale critical to the maintenance of resulting physical plants. It is not unusual, therefore, to discover plans for rural health systems inappropriately based on decidedly urban themes.

A universally comprehensive model of health care suggested by Torrens (1) includes 10 components—preventive medicine-public health; emergency care; simple ambulatory care; complex ambulatory care; simple acute care; complex acute care; long-term care;

mental health; transportation; and financial compensation. Although these functional components should be addressed during the planning of either an urban or a rural health care system, it must be recognized that a different set of assumptions may be linked with the rural plan. Each of the 10 components in the Torrens model may be distinctly different for a rural health system than for an urban health system. Moreover, each rural area or community has a unique ensemble of factors that must be incorporated into the plan for designing and operating a successful health system.

The formation of the Checkerboard Area Health System (CAHS) in northwest New Mexico was based on the 10 elements just mentioned. We describe the planning model used in this rural health setting and explain how it was implemented. The entire process of design and operation was undertaken for a remote geographic region having certain constraints that precluded adoption of traditional planning models for urban health care. This experience may be valuable to policymakers and planners confronted with health care environments that are not compatible with the characteristics of urban settings for which most planning principles have been developed.

Planning Constraints

The checkerboard area is a challenging environment for the establishment of a comprehensive health care system, as evidenced by its geography, population characteristics, economy, and existing health behavior.

Geography. The term "checkerboard" describes the pluralistic patterns of land ownership among Federal and State governments, the Navajo Tribe, the railroad company, and private individuals and organizations.

Dr. Reid and Dr. Smith are associate professors, Anderson Schools of Management, University of New Mexico, Albuquerque, N. Mex. 87131. This study was supported in part by the Department of Family, Community, and Emergency Medicine, University of New Mexico, and pursuant to a consultant service agreement with the Presbyterian Medical Service under HURA research grant No. 99-P-90185/6. Dr. Richard Kozoll, director of the CAHS, and his staff participated in the collection of data for the study. Tearsheet requests to Dr. Smith.

The climate, elevation, and vegetation vary widely within the region.

Since approximately 95 percent of all roads in the checkerboard area are unpaved, vehicular travel is inconvenient or difficult, sometimes unsafe. About 20 percent of all families have no access to a vehicle or live more than 1 mile from the nearest telephone. Thus, physical access to health care services is problematic. Moreover, if a health care provider is able to negotiate the roadways and determine the client's location, there is no guarantee that the patient will be there or that, if necessary, a timely return will be possible. Consequently, some health care personnel may be relatively nonproductive because of the significant amounts of time they must spend in traveling rather than delivering services.

Population characteristics. The population of the 4,000-square-mile checkerboard area is unique in several respects that may affect the health planning process. First, there are 14,000 American Indian (Navajo), Hispanic, and Anglo residents, and 5 of every 8 members of this population are Navajo. Further, 80 percent of the 14,000 are under age 45. These facts suggest that birth rates are high (young age of the population), infant mortality is high (minority-indigent characteristics of the population), demand by senior citizens is low (their low proportion and cultural variables associated with the ethnic groups), and environmentally generated disease (associated with primitive living conditions frequently found in this wilderness area) is high. Second, a number of epidemiologic constraints exist in this area. Health education is limited—the population generally has little conception of disease prevention. Further, alcoholism and infectious and parasitic diseases may be quite prevalent among this population.

Economy. Substantial evidence supports the observation that the checkerboard area is economically depressed. Five of every six residents are borderline or below the federally defined poverty level (2). Although the area does have natural resource extraction, small service businesses, trading posts, and government services, in some communities as many as 50 percent of the labor force may be unemployed. As a result, many residents depend on subsistence agriculture and stock-raising to supplement government financial assistance. This situation is further compounded by the unique cultural patterns, social mores, language barriers, and geographic isolation that affect employment potential. For example, the Hispanics and Anglos live in or near established communities, but the majority of the Navajos live in widely dispersed, isolated family camps and have limited access to traditional income sources in trade centers.

Existing health behavior. Although, at times, communication has been strained among the three ethnic groups with respect to certain community issues, they have collaborated to bring about water projects, sewer systems, school construction, and community recreation facilities that have upgraded sanitation and improved health status. However, the basic approach to contemporary health and medical care services is still rudimentary and for the most part episodic. Many of the people use folk healers such as herbalists, curanderos, or medicine men. Modern approaches to curative and preventive medicine are still viewed with suspicion, which would present a challenge to health educators if their services were to be made available. Modern sanitation is still an impending goal.

Obviously, the factors that are taken for granted in many urban-based health care plans—availability of health personnel, numerous health facilities, conven-

ient means of educating consumers and communicating with them, access to transportation, a relatively knowledgeable public, and high standards of sanitation—are nonexistent in the checkerboard area. Therefore the health system would need components that are not typical of planning models for a higher density population area. When the relevancy of the issues to the planning process was identified, these issues became important themes underlying the decisions on which the Checkerboard Area Health System was based.

Implementation of the CAHS

The formation of the CAHS resulted from the input of many individuals, groups, organizations, and agencies. However, the guiding force behind the planning process was the Presbyterian Medical Services (PMS) of Santa Fe, N. Mex. The informed and altruistic leadership of PMS supported and sustained the commitment to serve the health care needs of the rural southwest. PMS is an autonomous nonprofit organization that originated as a division of the Board of National Missions of the United Presbyterian Church. PMS is no longer under the control of its parent organization, but it continues to work closely with rural communities in establishing primary health care systems. Earlier efforts of PMS in sponsoring the delivery of rural health services have been documented (3-5).

The primary architect of the model, PMS continues to administer the CAHS. With the help of elected local, State, and national officials, tribal leaders, women's groups, medical providers, and other community leaders, PMS galvanized areawide concern into a feasible delivery system plan. Although not all of these groups agreed totally with the details of the resulting plan, substantial support for the basic concepts incorporated in the plan was provided readily by important opinion leaders. This outcome may have stemmed from the extensive local meetings concerning the CAHS design that helped to foster participation in the planning process. Of course, the PMS experience in grant writing and administration, as well as its earlier successes in establishing and operating rural primary health care facilities, extended credibility to the plan.

The resulting health care delivery plan was endorsed by the principal planning partners and supported financially by various Federal sources. After the plan was funded, a few impediments were encountered. Personnel problems surfaced almost immediately. In particular, a pool of trained support personnel did not exist in the area, and only a few highly trained experienced nurses and physicians could be attracted, on a long-term basis, to the area. Training programs

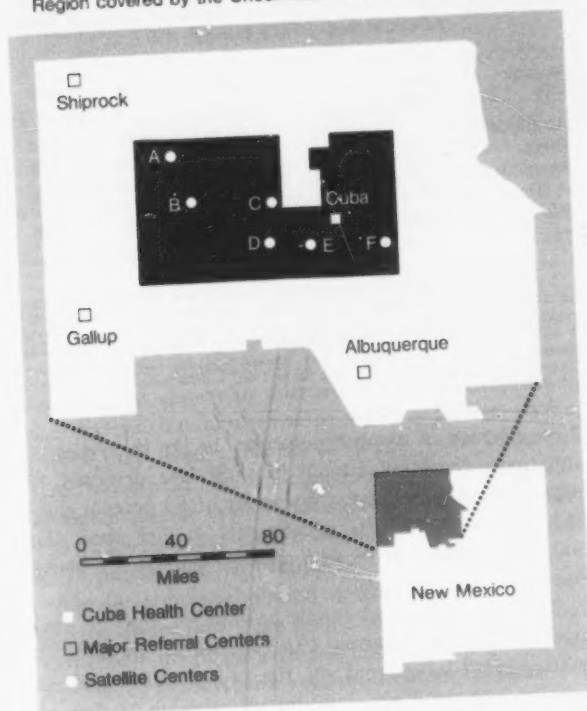
were initiated locally to create a cadre of ancillary and clerical personnel. Fortunately, the ideal-seeking plan attracted a physician with strong leadership qualities who in turn was able to recruit missionary-oriented paramedical and nursing personnel. More recently, the National Health Service Corps directed professionals to the area. Beyond the personnel training and retention problems, the CAHS encountered commonly occurring inefficiencies that often accompany the initial implementation of a plan in a remote rural region. These problems, however, along with the usual problems of change, did not seriously jeopardize the system plan.

The Checkerboard Area Health System progressed through stages of planning, implementation, and stabilization. The initial period, 1971-74, was characterized by system conceptualization and the planning for facilities, recruitment, and training of provider and support personnel. Late in this period, the development and ensuing use of health care services occurred. Although the system suffered a temporary crisis during 1975 when Federal grant support expired and health services had to be curtailed to some patient groups, financial security and system stabilization resulted from the receipt of several relatively long-term government grant and contract awards. Comprehensive health care delivery has been supported through an initial Federal demonstration grant by the Social and Rehabilitation Services (SRS) and through subsequent U.S. Public Health Service (USPHS) grants under the Health for Underserved Rural Areas (HURA) program. The system currently receives support through a USPHS grant under the Primary Care Research and Demonstration Program, administered by the Bureau of Community Health Services.

From its beginning, the CAHS was created around an integrated planning model that sought to provide a full range of health prevention and primary medical care services. Outreach, transportation, health promotion and maintenance, selected outpatient diagnosis and treatment, and limited emergency and inpatient services were incorporated into the system. Public and school health services such as well-child clinics, disease screening, health education, family planning, communicable disease control, and immunization services became integral CAHS programs.

Organizationally, the administrative, medical, and ancillary units of the CAHS were not differentiated by hierarchical status. From a functional perspective, the structural associations and staffing assignments for the various health service programs were developed along mutually dependent associations. Although accountable for total system performance, boundary-spanning and

Region covered by the Checkerboard Area Health System



coordinating activities were the chief functions of the administrator. His office was primarily responsible for administering policy throughout the organization and devising or maintaining external relationships, particularly in the fiscal area. The medical director was responsible for the delivery of direct patient services, a role that requires competency in both administration and patient care.

To improve the geographic accessibility of health care services for the checkerboard residents, a network of six satellite clinics was established. Satellite support services and more sophisticated health care resources were available from a centrally located diagnostic and treatment facility in Cuba, N. Mex. The system of satellite clinics was designed to overcome barriers of distance and isolation by delivering primary care services from locations as close to the people as possible. The spatial relationships among the CAHS facilities and major referral centers are shown in the map. The roadway distance separating the satellite clinics from the Cuba Health Center ranges from 30 to 85 miles. Contractual obligations require that most referrals of Indian patients be made to Indian Health Service hospitals in either Shiprock or Gallup, resulting in a trip of at least 3 hours. Secondary and tertiary patient care services are available in Albuquerque.

Each satellite facility provides similar services. All of the clinics have radio-equipped vehicles for transporting patients to facilities and staff to patients' homes. Total staff for the 6 clinics consists of 5 nurse practitioners and physician assistants, 1 licensed practical nurse, 1 emergency medicine technician, 11 comprehensive care assistants, and 5 clerks. Physician assistants or nurse practitioners supervise clinic activities and manage independently about 90 percent of all patient encounters. Immediate physician support is available by telephone or radio from the Cuba Health Center, which has 3 staff physicians, 4 registered nurses, 1 nurse practitioner and 1 physician assistant, 5 licensed practical nurses, 10 aides, 1 emergency medical service technician, 2 emergency medical technicians, 2 public health nurses, 1 outreach worker, 1 clerk, 1 nutritionist, and 1 school nurse. Each week, a staff physician visits each satellite to review charts, examine referral patients, and conduct staff training while monitoring the quality of care delivered.

The referral center for the satellite clinics is the Cuba hospital—a limited-services hospital that maintains 10 beds, 3 for obstetrics, 3 for pediatrics, and 4 for general medical purposes. Childbirth is a relatively frequent reason for hospital admission. Other conditions commonly treated in the inpatient unit include shigella, pneumonia, gastroenteritis, malnutrition, trauma, and acute intoxication. Some patients are admitted to insure that they are correctly prepared for complicated diagnostic procedures or to prepare them for transfer to other facilities for sophisticated medical procedures.

Besides providing inpatient medical services, the three CAHS physicians assist in the management of complex outpatient clinical or emergency room problems, supervise both locally and remotely based nurse practitioners and physician assistants, control the quality of services provided, and conduct inservice training and staff development workshops. Although the physicians are responsible for the delivery of all patient care, it is noteworthy that the extensive delegation of authority to nonphysician providers is an efficient and effective aspect of the CAHS model.

Health care services in the checkerboard area were eventually stabilized by systematic planning where constraints were identified, solutions proposed, alternatives selected and implemented, and results monitored and compared with expectations. When changes were necessary, they were made. Unlike previous health systems models based on urban-oriented constraints, the CAHS vigorously promoted new ways to provide health care services, which included the following:

- extensive use of paraprofessionals to provide primary care,
- a system of primary care services that promoted disease prevention whenever possible,
- a reliance on referral to alternative institutions from primary to tertiary care, thereby minimizing the tendency to construct a system around a large health care facility,
- the equalization of authority and roles as a result of extreme interdependencies among paraprofessional and professional staff members,
- the incorporation of community residents as ancillary and paraprofessional workers, and
- the provision of services over a very extensive geographic area where transportation is a hardship.

Results from the CAHS System

The CAHS medical services are diverse, yet they can be evaluated by analysis of inpatient, outpatient, and emergency room visits. The integration of the satellite clinics with inpatient and referral sources is largely represented by the use of the Cuba Health Center.

Inpatient performance measures. The CAHS opened its Cuba Health Center in September 1973. The center was designed originally to provide obstetrical care and short-term holding and observation services. Inpatients have been admitted continuously since its opening, except in March 1975 when insufficient funds for the reimbursement of inpatient services forced closing the hospital temporarily. Some selected measures of inpatient use of the facility are presented for calendar years 1975 through 1977 in table 1. Between 1975 and 1976, the number of hospital days increased by 93 percent but the number of admissions increased by only 29 percent, resulting in concomitant increases in average length of stay (to 3.1 days) and occupancy rates (to 63 percent). Although the 3-day average length of stay observed during 1976-77 is about one-half the average for acute-care general hospitals in

Table 1. Selected measures of inpatient use of Checkerboard Area Health System (CAHS) hospital at Cuba, N. Mex., calendar years 1975 through 1977

Measure	1975	1976	1977
Admissions ¹	579	747	804
Births ¹	100	107	118
Hospital days ²	1,197	2,309	2,305
Average length of stay	2.1	3.1	2.9
Percent occupancy rate	33	63	63

¹ Data obtained from CAHS inpatient log.

² Newborn hospital days are excluded. Hospital day data were obtained as follows: 1975—estimated by subtracting the mean length of stay for newborns in 1976-77 for each 1975 newborn from the total number of hospital days, data from CAHS business office; 1976—direct count from CAHS inpatient log, minimum stay assumed to be 1 day, 1 pediatric patient was hospitalized for 162 days; 1977—data provided by CAHS business office from billing records.

New Mexico, it appears appropriate for the types of inpatients that this limited hospital was designed to serve. The observed occupancy rate of 63 percent during 1976 and 1977 is significantly greater than the national average of 44 percent for small (6-24 beds) hospitals (6).

The age, sex, and ethnic groups of the 747 inpatients admitted during 1976 are shown in table 2. With respect to age and sex, the proportion of persons admitted to the Cuba hospital was similar to that of hospitals in most parts of the nation. Disproportionally less use by young persons, relatively higher rates for females in the childbearing age group (15-44) and lower rates for males in the 15-44 age group, proportional use relative to population estimates for both sexes in the 45-64 age group, and significantly higher use by all senior citizens are the expected trends observed. Furthermore, five of every eight persons in the catchment population were American Indian. Among the American Indians, young males had almost twice the admission rate of young females, and females aged 15-44 had more than twice the hospitalization rate of males in the same age group.

The association between inpatient use of the hos-

Table 2. Age, sex, and ethnic groups of CAHS inpatients admitted to the Cuba hospital during calendar year 1976

Age group (years) ¹	American Indian		Hispanic		Anglo		Total number		Total percent		Total by age	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Number	Percent
Under 15	127	78	3	4	3	1	133	83	17.8	11.1	216	28.9
15-44	89	220	9	23	1	21	99	264	13.3	35.3	363	48.6
45-64	43	47	8	4	6	2	57	53	7.6	7.1	110	14.7
Over 64	24	24	4	3	2	1	30	28	4.0	3.8	58	7.8
Total	283	369	24	34	12	25	319	428	42.7	57.3	747	100.0

¹ Age at last birthday.

Table 3. Frequency distribution of distance between residence and the CAHS hospital for all inpatients during 1979

Ethnic group	Estimated distance (in miles)				Total	Percent of total
	Less than 25	25-49	50-74	More than 74		
American Indian	10	474	139	29	652	87.3
Non-American Indian	66	8	0	21	95	12.7
Total	76	482	139	50	747	100.0
Percent of total	10.2	64.5	18.6	6.7	100.0	

pital and distance to patients' residences was a major consideration in the health plan regarding location of facilities. As shown in table 3, 474 (72.7 percent) of the Indian inpatients comprised the largest patient group that lived between 25 to 49 miles from the CAHS hospital. In contrast, most non-Indian subgroups lived less than 25 miles from the hospital. Also, 139 (21.3 percent) Indian inpatients lived between 50 to 74 miles from the hospital.

Finally, a cross-tabulation of admitting diagnoses and patient disposition is presented in table 4. More than 75 percent of all patients were discharged home, and another 20 percent were referred to other hospitals that have more sophisticated diagnostic or treatment capabilities. Planned referral for boarders accounted for almost one-half of all inpatients referred to other hospitals. With the exception of neoplasms and digestive system diseases, less than 30 percent of the inpatients

in all admission categories were referred to other hospitals. Only four inpatients died during 1976; one of these was a stillborn infant.

In sum, the inpatient performance of the CAHS indicates that good performance levels are attained when the measures—such as hospital days, admissions, and occupancy—generally used in assessing inpatient services are applied. The age and sex characteristics as well as the use experiences of inpatients are not highly different from those observed in other hospitals across the country. However, use by Indians was proportionally higher than that of the other ethnic groups in the catchment area. Moreover, the long distances that patients had to travel for care indicated a need for improved accessibility to medical services. Finally, only 20 percent of all the patients were referred to secondary and tertiary sources of care after they were admitted to the Cuba hospital.

Table 4. Number of inpatients per admitting diagnosis category by disposition for the CAHS in 1976

Admitting diagnosis category	Discharged home	Hospital referral	Nursing home or alcohol treatment facility	Died	Total
Infective and parasitic diseases	41	6	.....	...	47
Neoplasms	3	4	.....	1	8
Endocrine, nutritional, metabolic diseases	11	...	.....	...	11
Blood and blood-forming organ diseases	1	...	.....	...	1
Mental, psychoneurotic diseases	33	6	2	...	41
Nervous system, sense organ diseases	9	1	1	...	11
Circulatory system diseases	13	5	1	1	20
Respiratory system diseases	73	6	.....	1	80
Digestive system diseases	4	4	.....	...	8
Genitourinary system diseases	8	2	.....	...	10
Maternity	136	14	.....	...	152
Skin and cellular tissue diseases	6	...	.....	...	6
Musculoskeletal system diseases	5	...	.....	...	5
Symptoms and ill-defined conditions	56	20	.....	...	76
Injuries and accidents	67	11	.....	...	78
Newborn and stillborn	100	6	.....	1	107
Boarders awaiting referral	55	86	.....	...	141
Diagnostic tests	27	...	.....	...	27
Holding for observation	20	5	.....	...	25
Total	670	176	4	4	854
Percent of total	78.5	20.5	0.5	0.5	100.0

Outpatient clinic performance measures. The CAHS has maintained its commitment to the delivery of comprehensive ambulatory health services, and the wide range of health care resources presents a balanced offering of both preventive and curative outpatient services. Table 5 indicates that outpatient use increased at a rate of 15 percent a year. The largest gains in use occurred in preventive services; visits for both family planning and the Women, Infant and Child Nutrition Supplementation Program (WIC) nutritional services more than doubled between 1976 and 1977. Increases in screening and public health activities were more modest; 1977 visits were approximately $1\frac{1}{3}$ the number of the 1976 encounters. In sum, outpatient encounters for curative services increased about 11 percent between 1976 and 1977. Visits to the satellite and specialty clinics increased by about 20 percent each while some decrease was observed in both primary care visits at the Cuba Health Center and dental visits. Staff turnover problems may account for the reduction in visits for dental care. A comprehensive perspective of outpatient clinic performance indicates progressive improvement in use, especially for preventive services.

Emergency room performance measures. Emergency medical care is available 24 hours a day, 7 days a week from the emergency room, and 2 fully equipped ambulances with radio communication units are available to respond to medical emergencies in the catchment area and to transport patients needing sophisticated treatment to referral institutions. For a 1-year period starting in September 1976, a total of 3,098 visits were recorded for the CAHS inpatient facility emergency room; the average daily visit rate was 8.5 patients. Although no seasonal effect was expected or could be identified, trend analysis showed an increase of 38 patient visits per month in average utilization.

The average daily visit rate ranged from a low of 5.7 patients on Tuesdays to a high of 14.2 on Saturdays. Higher emergency room visit rates were noted on weekends and holidays when the outpatient clinic was closed and on Wednesdays when the clinic was on an abbreviated schedule. Relative to service area population proportions, a study of a 20 percent sample of emergency room visits, stratified by day of week, showed that use rates were lower for young females and all persons age 45 or older and higher for all persons between the ages of 15 and 44 years. The continued monitoring of these use patterns proved useful in revising planned resource allocations. In conjunction with these patterns, it became necessary to evaluate travel distances from a patient's residence to the CAHS

Table 5. CAHS outpatient visits for calendar years 1976 and 1977

Outpatient encounters ¹	1976	1977	Percent change from 1976 to 1977
Curative services:			
Satellite clinics ²	22,205	26,778	+21
Cuba Health Center	10,111	9,852	-3
Dental care	3,739	3,257	-13
Emergency room	2,821	3,198	+13
Specialty clinics	1,684	2,025	+20
Subtotal	40,560	45,110	+11
Preventive services:			
Screening ³	2,296	3,027	+32
Public health ⁴	2,178	2,073	+36
WIC nutritional ⁵	1,258	2,711	+115
Family planning	277	649	+134
Subtotal	6,009	8,460	+41
Total	46,569	53,570	+15

¹ Data obtained from monthly summaries of statistics tabulated by CAHS business office.

² Includes visits for well-child examinations and home visits from Cuba Health Center.

³ Includes school health examinations, group services, EPSDT visits, and adult medical screening activities.

⁴ About one-fourth of all encounters at satellite clinics are home visits which, according to the CAHS medical director, usually include some public health activities.

⁵ Women, Infant and Child Nutrition Supplementation Program.

emergency room. As for inpatient admissions, emergency visits are most often made by patients whose residences are 25 miles or more from the hospital. However, a higher percentage (27 percent) of the emergency room visits were by patients who lived less than 25 miles from the CAHS facility compared to the lower percentage (10 percent) of inpatients from this same mileage category (table 6); thus, certain communities within the catchment area may have used the system services selectively.

A cross-tabulation of the type of presenting problem

Table 6. Frequency distribution of distance between the CAHS emergency room and the patients' residences for a stratified sample of visits

Estimated distance (miles)	Emergency room visits	
	Number	Percent
In-State visits:		
Less than 25	178	27
25-49	281	44
50-74	81	13
More than 75	88	14
Out-of-State visits	13	2
Total	641	100

by patient disposition for the sample of emergency room visits is shown in table 7. For almost 80 percent of all visits the patient was discharged home. Of the 13 percent admitted to the CAHS hospital, slightly less than one-half went into the maternity wing. Trauma accounted for the majority of patients who were referred to other hospitals for diagnostic or treatment procedures, or both. Six persons (1 percent of the sample) died; however, four of these patients were dead on arrival.

A summary of emergency room performance in the CAHS indicates fairly heavy use, as expected for a rural health facility. Progressive gains were made in many dimensions of emergency services, most notably in the average number of visits per month. The uniqueness of providing care in the checkerboard area is evident from the distances traveled by most patients (25 miles or more) and the large number of maternity patients seen first in the emergency room and then admitted to the hospital.

A Comprehensive View of the CAHS

The planning for an integrated rural health care system in the checkerboard area resulted in greatly improved measures of performance in inpatient, outpatient, and emergency room services. However, more extensive planning was not the only stimulus behind improved system efficiency. Three corollary factors are considered to be primarily responsible for the increased use by inpatients. First, there has been a growing awareness and acceptance of the inpatient services by the target population. Second, increasing the productivity of CAHS providers and extending their associated medical expertise through ancillary personnel has permitted reasonable on-call coverage schedules and the treatment of more complicated conditions. Third, medical or administrative changes in admission and discharge policies reflect the availability of new Federal sources of funding support. It is highly prob-

able that these additional events would not have occurred in the inpatient area if a solid planning basis had not been established.

The outpatient program of the CAHS indicates that traditional ambulatory care can be integrated successfully with other health services more oriented toward health maintenance. Use of outpatient services increased at an annual rate of 17 percent, reflecting increased efficiency of the limited health care resources that are available. Although curative services were the major component of the total outpatient program, health promotion and disease prevention activities such as family planning and nutritional services were the strongest areas of growth. These gains are attributable to a comprehensive set of available services, competent and concerned clinical staff personnel, well-established internal referral procedures, and active consumer health education programs. These measures of performance reflect a background of planning by system providers and administrators, consumer representatives, and government officials.

Like the inpatient and outpatient areas, the emergency room at the Cuba Health Center achieved a relatively impressive service record, apparently as a result of a well-planned and implemented system. Given the constraints associated with planning an integrated health care system within this rural context, it is obvious that emergency services presented a stimulating challenge to the CAHS planners. Nonetheless, through early conceptualization and careful integration of all components of health care delivery, the performance of the emergency care subsystem of CAHS is exemplary. Although many patients must travel considerable distances to reach the emergency room, efficient and effective service is delivered promptly.

Finally, it is possible to assess the extent to which the CAHS has achieved a truly comprehensive system of health care relative to the elements previously iden-

Table 7. Cross-tabulation of presenting problem types by resultant patient disposition for a stratified sample of CAHS emergency room visits

Presenting condition	Home	Admission to Cuba hospital	Referral to other hospital	Death	Total
Trauma	158	14	25	2	199
Acute illness	275	20	10	...	305
Chronic illness	35	13	10	...	58
Followup service	27	1	1	...	29
Maternity	5	40	1	...	46
Dead on arrival	...	...	...	4	4
Total	500	88	47	6	641
Percent of total	78.0	13.7	7.3	1.0	100.0

tified by Torrens (1). As the preceding discussion indicates, public health services, emergency care, simple ambulatory care, simple acute care, and patient transportation—major components in Torrens' model—are key functional components of the Checkerboard Area Health System. Services required to provide both complex ambulatory and acute care are available through speciality clinics held periodically at the Cuba facility as well as through a referral network of secondary and tertiary physician and institution providers. Long-term rehabilitative care occurs, in part, through an outreach program whereby patient services are provided by home health workers. Current plans call for building a 25-bed skilled nursing or intermediate care facility in Cuba that will be integrated into the existing CAHS system.

Mental health services represent an important element of the Torrens' comprehensive health care system. Some patient counseling is provided by regular CAHS providers as well as a social worker. An isolation room at the inpatient facility has been used for emergency mental health care. In view of alcoholism problems in the target population, new plans calling for an additional commitment of health resources is necessary to obtain comprehensiveness. The final element in the Torrens' model, financial compensation, is also a key element related to the long-run goal of survival of the system. The CAHS has been designed, developed, and implemented with large, relatively long-term Federal program grants. Although significant administrative effort has been devoted to achieving fiscal

self-sufficiency, areawide poverty constrains the reality of financial viability on a fee-for-service basis. Hence, some form of direct or indirect government subsidy will probably be necessary to insure CAHS survival.

Although the CAHS planning for an integrated health care system has been successful in inpatient, outpatient, and emergency room care, many other aspects of improved health care are not easily measurable. The constraints of the rural setting are mainly responsible for the difficulties in providing rural health care. Nonetheless, the indications of better health care in the checkerboard area offer strong support for health policymakers and planners striving toward improved systems of health care. All persons involved in the planning must be keenly aware of the constraints present in rural areas before they progress toward putting a system into operation.

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SYNOPSIS

REID, RICHARD A. (Anderson Schools of Management, University of New Mexico) and SMITH, HOWARD L.: *Experience of the Checkerboard Area Health System in planning for rural health care*. *Public Health Reports*, Vol. 97, March-April 1982, pp. 156-164.

The design of rural health care delivery systems often is based on concepts obtained from urban models. The implicit planning premises of successful urban models, however, may be inappropriate for many rural systems. An alternative model planned and implemented in the checkerboard region of rural northwest New Mexico

has proved to be successful. This experience may be helpful to health care policymakers and planners confronted with environments that are not congruent with typical urban settings.

The checkerboard region presented a challenging health planning environment characterized by formidable geographic, population, economic, and health behavior constraints. The Checkerboard Area Health System (CAHS), designed to provide comprehensive services in an area dominated by these constraints, was formed around a central diagnostic and treatment facility with six satellite clinics. The CAHS used an innovative administrative structure, extended the productivity of traditional

providers by extensive use of mid-level and ancillary personnel, and created an effective referral network. These features are distinctly different from those of urban health care models.

Overall, the CAHS attained a high rate of inpatient use. Additionally, the performance of the outpatient program indicates that traditional ambulatory care can be integrated with other health services that are more oriented toward health promotion and disease prevention. Finally, the emergency room at the central facility has attained an impressive record that, like the inpatient and outpatient areas, is responsive to the needs of the target population.

Staffing a Contraceptive Service for Adolescents: the Importance of Sex, Race, and Age

SUSAN GUSTAVUS PHILLIBER, PhD
JUDITH JONES, BA

THE PROVISION OF CONTRACEPTIVE SERVICES TO teenagers is a relatively new undertaking in the United States. The national trend toward a lower age at first intercourse and concern over teenage pregnancy have encouraged new initiatives in providing contraceptive services to this age group. Perhaps because these initiatives are relatively new, there are yet a number of questions about the most effective strategies for attracting and keeping teenage clients.

An important characteristic of clinic services is the composition of the staff offering them. The authors of a national study of teenagers in family planning clinics reported (1):

The character of the interaction with staff was the single most important aspect of the clinic experience for almost all teens . . . teens put up with incredible inconvenience, long waits, confusing patient flow, and drafty exam rooms—and still liked the clinic if they had established rapport with even one staff member.

Virtually every article on the provision of contraceptive services to teenagers underscores the importance of trust, warmth, openness, and rapport between clinic

The authors are with the Center for Population and Family Health, Columbia University. Dr. Philliber is associate professor of public health and director of the social science research unit, and Ms. Jones is assistant director of the center. Brenda Aiken, a student at Columbia, assisted in data collection, and Pi-Yu Ting of the center performed the computer analysis.

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Tearsheet requests to Dr. Susan Gustavus Philliber, Columbia University Center for Population and Family Health, 60 Haven St., New York, N.Y. 10032.

staff and patients, but few document what characteristics of the staff might facilitate such relationships, particularly from the point of view of the patient. In this paper we examine the importance to teenagers of three demographic characteristics: the age, sex, and ethnicity of counselors and medical providers.

Since research on the development of adolescents suggests the importance of communication with an adult figure other than parents during these years, and the difficulty of young people in establishing such communication, it seemed likely that these visible characteristics might influence the ease with which patients and staff could communicate. Since the nature of such communication in a contraceptive service is intensely personal, it is particularly important to understand any barriers that may exist and, if necessary, to respond by changing the staffing patterns.

Methodology

The data for this study were gathered from a sample of 150 female patients at the Young Adult Clinic at the Columbia-Presbyterian Medical Center in New York City. These patients represent all of those attending the clinic at four consecutive sessions in August 1980. This clinic provides contraceptives, pregnancy testing, and other gynecological care to persons aged 21 years and younger. In its first 3 years, the clinic had more than 11,000 visits from some 4,000 people. These patients were primarily low-income blacks and Hispanics.

The counseling staff of the clinic includes males and females, whites, blacks, and Hispanics. They range in

Table 1. Importance of selected characteristics of counselors and examiners to female contraceptive patients (percentages)

Characteristics	Very important	Important	Not very important	Not important at all	Total	Mean score [†]
Counselor:						
Same sex	18.7	17.3	28.0	36.0	100.0	2.19
Same ethnicity	1.3	5.3	20.7	72.7	100.0	1.35
Same age	3.3	3.3	28.0	65.4	100.0	1.45
Examiner:						
Same sex	31.3	16.0	22.7	30.0	100.0	2.49
Same ethnicity	2.7	5.3	22.7	69.3	100.0	1.41
Same age	0.7	2.0	23.3	74.0	100.0	1.29

[†] Scale ranged from 1 = not important at all to 4 = very important.

age from teenagers who function as peer counselors to persons in their forties. The clinic's medical providers are nurse midwives and physicians, and they too are of both sexes and include blacks and whites. Since the staff is so heterogeneous, it seemed important to investigate whether clinic protocol should include guidelines for matching patient and staff for age, ethnic group, or gender.

During a 2-week period, patients were asked to complete self-administered questionnaires. Using a 4-point scale, they indicated how important it was that their counselor and the person who examined them match their age, ethnicity, and sex. The scale varied from "not important at all" to "very important." In addition, patients were asked to indicate their age, race-ethnicity, number of visits to the clinic, and if they had ever been pregnant or used a method of birth control. These last three items were included as rough measures of experience with contraceptives or gynecological examinations.

Results

Table 1 displays percentage distributions of the importance ratings young patients gave to the sex, ethnicity, and age of counselors and examiners in the contraceptive clinic. The table also includes a mean, or average, rating of the importance of each characteristic, calculated on a scale of 1 = not important at all to 4 = very important.

Perhaps the most important finding in table 1 is that although the sex of the counselor and examiner were important to many teenagers, the majority indicated that none of these characteristics was "very important." For each question, 53 to 97 percent rated the characteristic not very important or not important at all.

The characteristic with the highest importance rating was sex. About 47 percent of the patients considered it important or very important to be examined by a woman. In contrast, fewer than 10 percent of the

patients indicated that ethnic or age match with either counselor or examiner was important to them.

As table 2 indicates, these patterns varied somewhat by subgroup. The preference for female counselors and examiners was somewhat higher among the youngest patients, although this difference was not statistically significant. The youngest teens were significantly more likely to say that the ethnicity of their examiner was important, and Hispanic teenagers were slightly, but not significantly, more likely than black teens to indicate that ethnicity of counselors and examiners was important.

If previous pregnancy, previous use of birth control, or earlier visits to the clinic are indicators of more experience with the medical care system in general, then such experience did not seem to lessen patients' perceptions of the importance of these demographic characteristics. In fact, on some of the comparisons, those with more experience were somewhat more likely than those without experience to say that these characteristics are important to them. None of these differences was significant, however.

Discussion

These results indicate that the sex of her counselor and examiner in a contraceptive clinic was more important to the female teenager than ethnicity or age.

Perhaps more important than this finding, however, was the relatively low importance ratings given to the ethnicity and age of counselors and providers. Only among the youngest teens did we find significantly greater importance given to ethnic match with the person doing physical examinations. Even in this group, only 17 percent of the teens said ethnicity was important. While few previous studies have dealt with these topics among adolescent contraceptive patients, the importance of sex might be expected from data gathered in similar clinics and from other research on characteristics of counselors and interviewers.

For example, the national study of teenagers in

family planning clinics done by the Urban and Rural Systems Associates did consider the age and sex of medical personnel but not their race and ethnicity (1). About half of the sample of female teens indicated that it did not matter whether the person examining them was male or female, but very few preferred males. Furthermore, patients examined by women were twice as likely to say they liked the physician "very much" and younger, Latin, and Asian teens were more likely to prefer female examiners than were other teens. Similarly, younger teens were more likely to say that they preferred a young physician rather than an older one.

In addition to these studies among adolescent contraceptive clients, studies among adult women indicate that, particularly for certain ethnic groups, provider characteristics may be extremely important. Scrimshaw (2) for example, has discussed the existence of "vergüenza" or shame and embarrassment among Latin American women in Ecuador. A sense of vergüenza carries with it an awareness of the need to be modest in all behavior, and this feeling may create special problems for women visiting family planning clinics. Apparently because of vergüenza, all of the women interviewed in the Scrimshaw study said that they preferred female physicians. However, the young Hispanic women in our sample were no more likely to prefer female providers than were the black women. Perhaps

the acculturation of these young women is already such that vergüenza is not so acute among them.

In addition to the research within the context of contraceptive service programs, there have been more general and extensive investigations of client or patient preferences for counselors, therapists, or "helpers." In this research, relatively less attention was given to age than to race and sex preference, and many of these researchers used college student samples. Furthermore, the findings on the importance of counselor attributes are contradictory.

For example, in studying the importance of racial similarity between client and counselor to client satisfaction with counseling, Ewing (3) found no support for the suggestion that students receiving precollege counseling should be racially matched to counselors. Among 75 college students in Texas, however, Thompson and Cimbalic (4) reported that, when forced to choose between black and white counselors, black students were more likely to choose blacks and to use a counseling center that had black counselors. In a study among college students in a special program for the disadvantaged, Gordon and Grantham (5) found only a slight preference for helpers of the same race. Instead, students were much more likely to express a preference for helpers of the same socioeconomic status background.

Adopting a somewhat different emphasis, Fry and

Table 2. Difference among subgroups of female contraceptive patients in the importance of selected characteristics of counselors and examiners

Characteristics of patients	Percent saying important or very important					
	Counselor			Examiner		
	Same sex	Same ethnicity	Same age	Same sex	Same ethnicity	Same age
Age:						
16 or younger	38.1	4.8	9.5	57.1	16.7 ¹	4.8
17-19	35.9	7.7	3.8	43.6	6.4	2.6
20-21	33.3	6.7	10.0	43.3	0.0	0.0
Ethnicity:						
Black	36.6	4.3	6.5	48.4	6.5	3.2
Hispanic	35.4	10.4	6.3	47.9	12.5	2.1
Previous pregnancy:						
Yes	37.3	9.0	10.4	47.8	9.0	1.5
No	34.9	4.8	3.6	47.0	7.2	3.6
Ever use birth control:						
Yes	37.7	6.1	7.0	47.4	8.8	3.5
No	30.6	8.3	5.6	47.2	5.6	0.0
Visit to young adult clinic:						
First visit	36.0	6.0	6.0	44.0	4.0	0.0
Revisit	36.0	6.0	7.0	49.0	10.0	4.0

¹ Chi-square is statistically significant at the .05 level.

co-workers (6) examined the impact of racial matching on counselor behavior. Their results indicated that counselor trainees who were racially matched to clients were more appropriately "attending" and "expressive" in their response styles than were trainees not matched to their clients.

Also, several studies of sex preferences for counselors have been reported; however, like the research on racial preference, the findings are mixed and inconsistent. Highlen and Russell have recently summarized this literature (7):

Although research on female clients' preferences for male and female counselors has been conducted for more than two decades, results have been inconsistent and far from conclusive. Although some studies have found that females prefer male counselors . . . , others have reported that women prefer same-sex therapists. . . . Adding further confusion to the literature are studies reporting no effect for counselor gender.

Although the overall findings in these studies were inconsistent, the researchers who conducted them offered two important suggestions. First, it seems apparent that preference for a counselor of the same or opposite sex may depend on the subject matter of the counseling. For example, in studying the effects of counselor gender on perceived credibility with clients, Lee and co-workers (8) reported that both male and female secondary school students preferred a male counselor if they had vocational concerns, but they preferred female counselors to talk about such subjects as child rearing. Studies by Fuller (9) and Boulware and Holmes (10) also indicated that females prefer female counselors when their concerns are of a more "personal" nature. Given that most of the family planning clinic interviews with young clients concern sexual or contraceptive behavior, our findings are not surprising.

A second finding, and one that may help explain the generally ambiguous results, is that it may not be gender per se which is valued by clients, but rather certain sex role behaviors of counselors. Feldstein (11), for example, has reported an interesting interaction effect between the gender of the client and the perceived masculinity or femininity of the counselor. "Male clients with feminine counselors and female clients with masculine counselors indicated greatest satisfaction and counselor regard." In a similar vein, Highlen and Russell (7) suggest that clients often express a preference for counselors who possess stereotypic feminine traits, such as warmth and understanding. Perhaps characteristics perceived or assumed to accompany gender may account for the findings of this and other studies that some clients prefer female counselors.

A third body of reports in the literature may also

be useful in discussing appropriate characteristics of staff members for contraceptive programs for adolescents. These reports deal with the effects of interviewer and respondent characteristics on responses to survey questions. Since much of the work of counselors and medical providers in teenage family planning clinics requires interviewing, these findings are of interest.

In a summary of what is known about effects of various factors on responses, Sudman and Bradburn (12) indicated that the demographic characteristics of an interviewer are relatively less important than other factors such as the setting or style of the interview. When the subject matter of the interview is closely linked to some characteristic of the interviewer, however, response effects are more evident. For example, persons being interviewed about their racial attitudes may respond differently to black or white interviewers, but if they are being interviewed about their preferences for a specific brand of soap, the race of the interviewer is less important. Sudman and Bradburn stated:

matching of interviewers has no effect on response unless the issues are related to the respondent and interviewer characteristics. . . . The use of black interviewers in black areas for a study of medical needs may make it easier to obtain cooperation from community groups, obtain qualified interviewers, and reduce travel costs, as well as providing work for people in the area. It will not, however, increase the respondent's willingness to cooperate or change his reporting of medical needs.

It is possible that, even with the anonymity provided to patients in our research design, they felt hesitant to admit true preferences. Further, the Young Adult Clinic has a staff and a patient population that is primarily black and Hispanic. Perhaps in a setting where young people perceive a general ethnic match, the characteristics of a particular counselor or examiner assume less importance.

If we take these patients at their word, however, then several tentative recommendations follow from the data. First, teen clinics should make every effort to include at least one female counselor and medical provider on the staff. Then, either by asking patients about their preferences or by acceding to these preferences when they are volunteered, those teens for whom it is important may be seen by a female. Although gender matching would not have been necessary for the majority of patients in this study, a substantial minority of young people indicated such a preference.

Second, it appears that ethnic and age match of counselors or examiners and patients is not particularly important. This observation means that clinics may be

free to use either peer or older counselors and, except for language problems, need not match providers and patients by ethnicity.

While we did not measure it, other authors have suggested that the most important characteristics of any staff person are likely to be warmth, acceptance, and a genuine attitude of caring for young patients. In fact, Highlen and Russell (7) indicate that, as more information about a particular counselor is introduced, superficial characteristics such as gender become less important.

It is gratifying that such characteristics as sex, ethnicity, and age are of little importance to our clients. Nevertheless, further research is needed to determine if, in fact, the overall ethnic image of the clinic is a major determinant of patient attitudes and acceptance of its services.

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SYNOPSIS

PHILLIBER, SUSAN GUSTAVUS (Center for Population and Family Health, Columbia University) and JONES, JUDITH: *Staffing a contraceptive service for adolescents: the importance of sex, race, and age. Public Health Reports, Vol. 97, March-April 1982, pp. 165-169.*

Since there are data to indicate that the composition of clinic staff is important in attracting and maintaining contact with adolescents seeking

contraceptive services, in this paper the importance of age, sex, and ethnicity of counselors and medical providers is examined. Female clients of the Young Adult Clinic at Columbia-Presbyterian Hospital, New York City—most of them low-income blacks or Hispanics—were asked to complete questionnaires. The 150 respondents, aged 16-21 years, used a 4-point rating scale of very important = 4 to not important at all = 1.

The findings indicated that the sex of the counselor and examiner was

more important to female teenagers than ethnicity or age. Clinic administrators seeking to provide contraceptive services to teenagers should make an effort to include at least one female counselor and medical provider. However none of these characteristics was very important to the majority of patients.

These findings are discussed in the context of the literature on the provision of contraceptive services to teenagers and on patient preferences for counselors or therapists in general.

Decreasing Prevalence of Q Fever in Illinois

RUSSELL J. MARTIN, DVM, MPH
PAUL R. SCHNURRENBERGER, DVM, MPH
DEAM H. FERRIS, PhD
PAUL N. HANGER, BS
RICHARD A. MORRISSEY, MPH

THE ORGANISM THAT CAUSES Q FEVER, *Coxiella burnetii*, was first isolated in the United States in 1935 in Montana. It was isolated from a tick, *Dermacentor andersoni* (1). The first time that clinical illness due to the organism was recognized in Illinois residents was during an outbreak in a Chicago packing plant in 1946 (2). Subsequent studies in Illinois revealed that antibodies to *C. burnetii* were present in cattle, sheep, swine, and man (3).

Clinical disease in people in the western United States has occasionally been associated with *C. burnetii* (4). In fact, 67 percent of the 785 cases reported to the Center for Disease Control from 1948 to 1977 were from California (5). Although various studies in the eastern United States have shown a high prevalence of anti-

Dr. Martin is communicable disease epidemiologist, Illinois Department of Public Health. At the time of the study, Mr. Hanger (now retired) was supervisor of the department's Grade A Milk Program, and Mr. Morrissey (also retired) was chief of its division of laboratories. Dr. Schnurrenberger is professor of public health, School of Veterinary Medicine, Auburn University, Auburn, Ala. Dr. Ferris is with the Plum Island Disease Laboratory, Greenvale, Long Island.

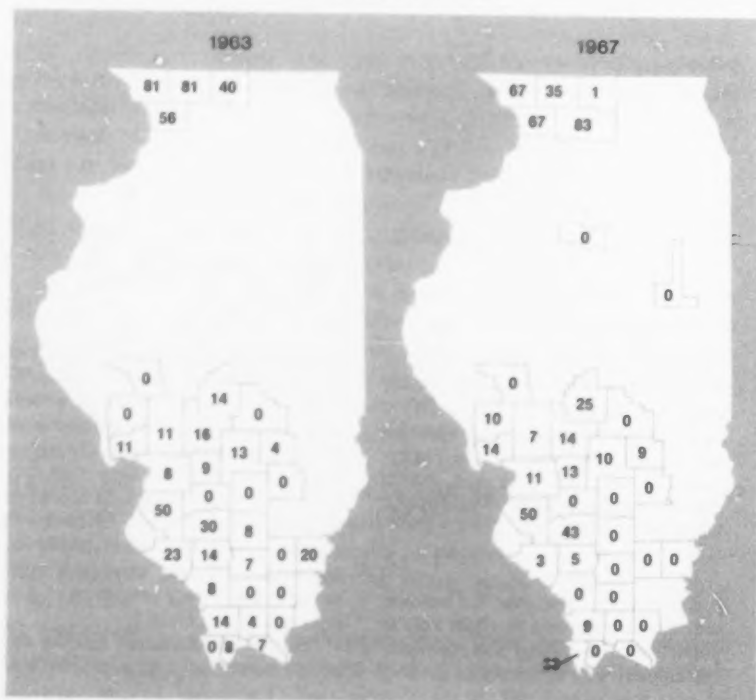
Tearsheet requests to Russell J. Martin, DVM, Communicable Disease Epidemiologist, Illinois Department of Public Health, 535 West Jefferson St., Springfield, Ill. 62761.

body to the organism in man and increasing infection rates in cattle, few cases of clinical illness associated with *C. burnetii* have been found in either species (3, 6-9, 10). There is little public concern about, or concentrated surveillance of, this disease, apparently because of its rarity. In this report we describe the results of a multifaceted surveillance program in Illinois.

Methods

Detection in cattle. In the summers of 1963 and 1967, milk samples collected from producers supplying dairies in northern (Freeport), central (Litchfield), and southern (Carbondale) Illinois were examined at the University of Illinois College of Veterinary Medicine for antibody to *C. burnetii* by means of the capillary

Percentage of dairy herds in Illinois counties with milk samples reactive to *Coxiella burnetii* capillary agglutination test



agglutination test (CAT) of Luoto (11). The antigen was the Ohio strain obtained from the Center for Disease Control, and only complete agglutinations were considered reactive. Standard positive and negative control serum samples were included in each test run. The results of the 1963 and 1967 studies were compared on a milkshed and an individual farm basis.

To explore the possible association of Q fever infection and infertility in cattle, records of the American Breeders' Service and Northern Illinois Breeders' Cooperative Association were searched for herds from which milk samples were tested in 1963. The predominant breed of cattle and the number of visits in 1963 by inseminators were recorded for each herd. Each visit was tabulated according to whether it was the first, second, or third time the specific cow had been inseminated during the current lactation period. This information was compared with the 1963 CAT status of the herd.

Finally, the 1963 mean monthly catalase test results of a major Illinois milk company were calculated for the study herds and compared with the CAT results in an effort to explore the possible association of *Coxiella* infection and mastitis.

Detection in man. Q fever in human beings was a reportable disease in Illinois until 1977. The two cases reported in the period 1963-77 were investigated by the Illinois Department of Public Health.

To determine the prevalence of antibody to *C. burnetii* in persons who had contact with cattle, the health department's division of laboratories tested, with the complement-fixation (CF) technique, serum samples collected from veterinarians attending the 1956, 1964, 1966, 1968, 1970, and 1972

annual meetings of the Illinois State Veterinary Medical Association. A Nine Mile strain commercial antigen was used, and a titer of 1:8 was considered reactive. Serums that had been collected from employees of a Peoria County abattoir during a 1966 brucellosis outbreak, then frozen and stored at -20° centigrade, were also tested for antibodies to *C. burnetii* by the CF technique (12).

Preemployment serum samples were collected from all new employees at a Cass County abattoir starting in 1967 when the plant opened; collection continued for the duration of our study. The samples were tested for *C. burnetii* antibody with the CF test at the Illinois Department of Public Health laboratories and with the CAT test at the College of Veterinary Medicine laboratory. CAT titers of 1:1 were considered reactive.

Results

Antibody in cattle. Milk samples from 37.7 percent of the 2,277 herds tested in 1963 were reactive to the Ohio strain of *C. burnetii* (see map for 1963), varying from 10.6 percent (58 of 545 herds) in the southern portion of the State and 10.5 percent (71 of 673) in the central part to 68.8 percent

(729 of 1,059) in northern Illinois.

In the 1967 retest of these milksheds, milk from 19.2 percent (380 of 1,975) herds was reactive. The reactor rates were 3.6 percent (11 of 303 herds) in the south, 10.8 percent (85 of 784) in the central portion of the State, and 32 percent (284 of 888) in the north (see map for 1967).

Of a total of 2,565 different herds tested in the two surveys, milk samples from 853 (33.3 percent) were reactive. Of all herds, 1,687 (65.8 percent) were tested on both occasions. Milk from 1,050 herds was negative and milk from 175 herds was reactive on both tests. One hundred forty-nine herds converted from negative for antibody in 1963 to positive in 1967; 313 reverted from positive to negative. Converters outnumbered reverts only in the central portion of the State. In Stephenson County, in northern Illinois, the 1963 reactive rate for Holstein herds was 60.2 percent (210 of 349) compared with 45.7 percent (21 of 46) for herds consisting primarily of other breeds.

Insemination records were available on 13,962 cows from 408 herds. Repeat insemination visits were necessary for 2,949 (21.1 percent) of the cows, and at least 3 visits were required to produce

Table 1. *Coxiella burnetii* complement-fixation test results on serum from Illinois veterinarians collected in 6 years

Reactive titer	Number of reactors in 6 selected years					
	1956	1964	1966	1968	1970	1972
1:8	10	3	3	0	0	0
1:16	5	2	1	0	0	0
1:32	0	0	0	0	0	0
1:64	2	0	0	0	0	0
1:128	0	1	0	0	0	0
Total reactive	17	6	4	0	0	0
Number tested	128	152	110	155	138	128
Percent reactive	13.3	3.9	3.6	0	0	0

Table 2. *Coxiella burnetii* complement-fixation test results on serum samples collected from Illinois veterinarians with at least one reactive serum sample

Veterinarian No.	Titer, by year tested						Practice type (1967)
	1956	1964	1965	1968	1970	1972	
1	1:64	NT	NT	NT	NT	NT	Military.
2	1:64	NT	NT	NT	NT	NT	Government.
3	1:16	1:8	NT	NT	NT	NT	Large.
4	1:16	NT	Neg	NT	NT	NT	General.
5	1:16	NT	NT	NT	NT	NT	Large.
6	1:16	NT	NT	NT	NT	NT	General.
7	1:16	NT	NT	NT	NT	NT	Small.
8	1:8	Neg	Neg	NT	Neg	NT	General.
9	1:8	Neg	NT	NT	NT	NT	Large.
10	1:8	NT	NT	NT	NT	NT	Small.
11	1:8	NT	NT	NT	NT	NT	General.
12	1:8	NT	NT	NT	NT	NT	Unknown.
13	1:8	NT	NT	Neg	NT	NT	Teaching.
14	1:8	NT	NT	NT	NT	NT	Large.
15	1:8	NT	NT	NT	NT	NT	Small.
16	1:8	NT	NT	NT	NT	NT	Small.
17	1:8	NT	NT	NT	NT	NT	Government.
18	Neg	1:128	Neg	Neg	NT	NT	Small.
19	Neg	Neg	1:16	Neg	Neg	Neg	Large.
20	NT	1:16	NT	Neg	NT	NT	Large.
21	NT	1:16	NT	NT	NT	NT	Large.
22	NT	1:8	NT	NT	NT	NT	Government.
23	NT	1:8	NT	Neg	NT	NT	Large.
24	NT	Neg	1:8	Neg	Neg	Neg	Government.
25	NT	NT	1:8	Neg	NT	NT	Large.
26	NT	NT	1:8	NT	NT	NT	Unknown.

NOTE: NT = not tested. Neg = negative.

conception in 930 (6.7 percent). Of the cows in herds with CAT reactive milk, 21.4 percent required repeat visits, and 6.8 percent needed at least 3 visits.

Catalase results were available on only 114 herds. The 78 herds with reactive milk had a mean catalase reading of 25.3 percent compared with 27 percent for the 36 herds with nonreactive milk.

Antibody in man. Only two cases of Q fever have been reported in Illinois residents since 1963. One occurred in 1969 in an adult male from St. Clair County who was responsible for moving live cattle in an abattoir, and one occurred in 1970 in a 19-year-old male college student from Cook County.

Reaction rates for serum collected from veterinarians decreased from 13.3 percent in 1956 to 0 percent in 1968, 1970, and 1972 (table

1). The 27 reactive serum samples from the 6 test periods were from 26 veterinarians (table 2). Eleven of the 26 were retested after the reactive sample was collected. Serum from 10 retested after 2 to 12 years had become nonreactive; 2 serums remained reactive. The practices of these 26 veterinarians included regulatory medicine and

teaching as well as large, general, and small animal practices; the lowest reaction rate was for small animal practitioners (table 3).

Serums were tested from 526 (67.2 percent) of the 783 Peoria County abattoir employees in 1966. Serums from 14 (2.7 percent) were reactive—7 had titers of 1:8, 2 of 1:16, and 5 of 1:32. Samples

Table 3. Practice type of Illinois veterinarians with serum tested against *Coxiella burnetii* on one or more occasions, 1967

1967 practice type	Veterinarians in Illinois	Tested (1956-72)		Reactive ¹	
		Number	Percent	Number	Percent
Large animal	334	118	35.5	9	7.6
General	101	42	41.6	4	9.5
Small animal	397	111	28.0	5	4.5
Teaching	47	11	23.4	1	9.1
Government	142	52	36.6	4	7.7
Other and unknown	175	52	29.7	3	5.8
Total	1,196	386	32.3	26	6.7

¹ Complement-fixation test titer $\geq$ 1:8.

Table 4. Length of employment of workers at an Illinois abattoir tested for antibody to *Coxiella burnetii*, 1966

Years employed	Total plant population	Tested		Reactive ¹	
		Number	Percent	Number	Percent
0-5	197	124	62.9	5	4.0
6-25	513	355	69.2	9	2.5
26 or more	71	45	63.4	0	0
Unknown	2	2	100.0	0	0
Total	783	526	67.2	14	2.7

¹ Complement-fixation test titer $\geq$ 1:8.

from 4.5 percent of the 176 persons aged 35-44 were reactive compared with 2.2 percent of the samples from the 134 people who were younger than 34 and 1.4 percent of the samples from the 213 who were 45 or older. However, the rates of reactors decreased as their length of employment increased (table 4).

Although there was no correlation between the percentage of reactors and their degree of exposure to cattle within the plant, the reaction rate was highest for employees who had the greatest exposure to swine (table 5). The distribution of the height of the titers was similar for whites and nonwhites; however, titers of 1:8 or greater were more common in nonwhite employees than in white; 6

of 147 (4.1 percent) nonwhite employees were reactors in contrast to 8 of 379 (2.1 percent) white employees, although the difference was not significant. This difference was more marked (but, again, it was not significant) when examined on a race-sex basis; only 5 of 289 (1.7 percent) white men were reactors in contrast to 6 of 144 (4.2 percent) nonwhite men. Three of 90 (3.3 percent) white women were reactors compared with 5 of 289 (1.7 percent) white men. Since only three nonwhite women were tested, no valid conclusions could be reached concerning that group.

Four of 40 (10 percent) of the employees who wore eyeglasses were reactors in contrast to 2 of 103 (1.9 percent) who did not. This difference was found in both races,

but the difference was not statistically significant.

Only 2 (0.1 percent) persons among the 1,432 tested before employment in the Cass County abattoir had reactive serums—1 each at 1:16 and 1:64 by the CF test. Both of their serums were antibody negative by the CAT.

Discussion

The findings on conception rates and the catalase test results, although inconclusive because of the study design and small numbers, agree with the reports that Q fever does not cause infertility and mastitis (12).

Although the small number of human reactors found must be considered when evaluating the data, the results do suggest that Q fever was not a common occupational infection among Illinois veterinarians or abattoir workers during the study period. Similarly, it is not a commonly reported disease in the State. The low reaction rate in a biased group—persons receiving preemployment examinations at abattoirs—although not representative of the general population, suggests that human infection is infrequent in Illinois.

The decrease in reaction rates among older abattoir employees

Table 5. Relationship between reactive rates of employees in an Illinois abattoir tested against *Coxiella burnetii* and their exposure to cattle and swine, 1966

	Exposure to cattle			Total	Exposure to swine		
	Maximum ¹	Moderate ²	Minimum ³		Maximum ¹	Moderate ²	Minimum ³
Total plant population	77	132	574	783	113	242	428
Number tested	55	89	382	526	73	170	283
Percent tested	71.4	67.4	66.6	67.2	64.6	70.2	66.1
Titers:							
1:8	1	1	5	7	2	2	3
1:16	0	0	2	2	1	0	1
1:32	0	1	4	5	3	0	2
Total	1	2	11	14	6	2	6
Percent reactive	1.8	2.2	2.9	2.7	8.2	1.2	2.1

¹ Contact with warm meat.

² Contact with chilled meat.

³ Contact with cured, smoked, or wrapped meat; or no contact with meat.

could represent an early infection followed by the buildup of a lasting resistance to *C. burnetii* despite a relatively short life of *C. burnetii* CF antibody. This explanation would also apply to the findings related to length of employment. The apparent racial difference in the abattoir employees could be a reflection of the disproportionately large percentage of maximally exposed nonwhites (13). The high reaction rates in abattoir workers who had contact with swine is surprising, since *C. burnetii* has rarely been associated with swine, although it is still prevalent in the cattle population in Illinois.

The decrease in reactors in any single phase of this study could possibly be explained by antigenic shifts or decreased antigen sensitivity in the laboratory, but the use of adequate laboratory controls and the total agreement in all phases of the surveillance program suggest that a true decrease in prevalence occurred. This decrease would not be expected in light of the consolidation of dairy herds in Illinois; increased mobility of dairy animals should increase the probability that a given herd would be exposed. Large herds and the Holstein breed have been associated with higher reaction rates in Ohio (6).

The decreased prevalence of antibody to *C. burnetii* could signal a

markedly lower resistance of Illinois cattle herds, which could leave the way open for an explosive outbreak of Q fever in man and animals if a highly virulent strain should be introduced. The decrease noted in Illinois is not consistent with the 1967 observation that milk from 99 percent of the 268 dairy herds in Los Angeles County were reactive to the CAT (14). Other statements concerning increases in prevalence (5) are based on studies completed in 1962 (8). The discrepancy deserves clarification through studies designed to detect changes in prevalence over a broad section of the nation.

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SYNOPSIS

MARTIN, RUSSELL J. (Illinois Department of Public Health), SCHNURRENBERGER, PAUL R., FERRIS, DEAM H., HANGER, PAUL N., and MORRISSEY, RICHARD A.: Decreasing prevalence of Q fever in Illinois. Public Health Reports, Vol. 97, March-April 1982, pp. 170-174.

There were 858 (37.7 percent) Q fever-infected dairy herds among the 2,277 tested in Illinois in 1963. The

percentage decreased to 19.2 percent (380 of 1,975) in 1967. Reaction rates (complement-fixation test titer of 1:8 or greater) in serum samples from veterinarians decreased from 13.3 percent in 1956 to 3.9 percent in 1964 and from 3.6 percent in 1966 to 0 percent in 1968, 1970, and 1972. There were 14 (2.7 percent) reactive serum samples among 526 abattoir workers tested in 1966; reaction rates were higher among workers

having contact with swine (8.2 percent) than among workers having contact with cattle (1.8 percent). Two (0.1 percent) of 1,432 serum samples collected from 1967 to 1971 during preemployment examinations at another abattoir were reactive. Only two clinical cases of Q fever were reported to the Illinois Department of Public Health in the period 1963-80. All evidence points to a decreasing prevalence of Q fever in Illinois.

OSHA Criteria for Laboratory Proficiency in Blood Lead Analysis

ROBERT E. DONADIO, PhD

THE OCCUPATIONAL SAFETY and Health Act of 1970 was aimed primarily, to the extent possible, at assuring that every working man and woman be provided working conditions that are free from recognized hazards. To protect workers exposed to inorganic lead, the occupational health standard for inorganic lead was promulgated on November 14, 1978.

Central to its protective features is the standard's requirement for providing periodic blood lead monitoring of workers whose health is at risk because of their exposure to lead above the action level of 30 $\mu\text{g}/\text{m}^3$ of air for more than 30 days a year. Elevated blood lead levels of 40 $\mu\text{g}/100$ gm of whole blood or more trigger certain other protective measures. Chief among these measures is medical removal protection (MRP): removing workers from excessive exposure to lead until their blood lead levels drop to specified safer levels that permit their return to normal duties.

In developing the lead standard, the Occupational Safety and Health Administration (OSHA) was concerned with the reliability of blood lead analysis as it impinges on workers' health, particularly with regard to MRP. The Centers for

Disease Control was delegated specifically to monitor and evaluate the performance of all laboratories that analyze blood specimens of employees affected by workplace exposure to lead.

The OSHA lead standard, 29 CFR 1910.1025(j)(2)(C)(iii), requires that such analyses:

shall have an accuracy (to a confidence level of 95%) within plus or minus 15 percent or 6 $\mu\text{g}/100$ ml, whichever is greater, and shall be conducted by a laboratory licensed by the Centers for Disease Control (CDC) or which has received a satisfactory grade in blood lead proficiency testing from CDC in the prior twelve months.

This statement has led to some confusion on the part of both employers and testing laboratories in complying with the provision. The OSHA-CDC program described here was designed to aid in implementing the standard's requirements for accuracy in blood lead analysis.

CDC has conducted proficiency testing surveys since 1976, in recognition of the toxic effects of lead and of the analytical problems encountered by laboratories in obtaining precise and accurate blood lead results. Participation is mandatory for laboratories licensed for blood lead analysis by the Health Care Financing Administration under the Clinical Laboratory Improvement Act (CLIA). (CDC no longer licenses laboratories.) Other laboratories that are not under

Federal jurisdiction are enrolled as voluntary participants.

In a cooperative effort initiated in 1979, CDC has provided support for the lead standard, in conjunction with its blood lead proficiency testing (PbB-PT) program. OSHA has established performance criteria for the PbB-PT program that are equivalent to the level of accuracy required by the lead standard.

Performance Criteria

Employers who are required to provide medical surveillance of workers exposed to lead must use laboratories for blood lead analysis that meet the requirements for satisfactory performance in the CDC's PbB-PT program. CDC conducts quarterly surveys of laboratories in the program, which consists of testing at least three samples of lead-containing bovine blood. To maintain a satisfactory performance rating, a participating laboratory must obtain results within ± 15 percent of each sample's target concentration, or ± 6 $\mu\text{g}/\text{dl}$ for samples with lead concentrations of less than 40 $\mu\text{g}/\text{dl}$, for 8 out of 9 samples in the most recent 3 consecutive surveys.

An approved laboratory will be dropped from OSHA's list of qualified laboratories if it (a) fails to participate in a survey, (b) fails to meet the deadline for reporting its results (exceptions can be made for unusual circumstances), or (c) reports an incorrect analysis for more

Tearsheet requests to Dr. Robert E. Donadio, OSHA, Division of Occupational Health Programming, 200 Constitution Ave., N.W., Rm. N3608, Washington, D.C. 20210.

than one of nine samples in a three-quarter period (that is, less than eight out of nine samples). Approved laboratories may be excused from participating in a survey owing to circumstances beyond their control. However, to remain on the list, they must then document that they did not analyze any patient blood lead specimens during the period in which the test samples would have been processed.

Sample Results

CDC uses selected reference laboratories to establish the lead concentration of each sample. The reference laboratory mean is designated as the target value. These laboratories use reliable methodology such as atomic absorption, anodic stripping, voltametry, or other analytical methods that have been shown to give acceptable results within the 95 percent confidence level.

Each reference laboratory also must demonstrate consistently accurate lead results for at least 1 year before it is selected as a reference laboratory for the CDC program. Beginning with the first quarter of 1981, each sample distributed in the CDC surveys also has been analyzed by the National Bureau of Standards (NBS) by use of the isotopic dilution-mass spectrometry (IDMS) method. The IDMS values from NBS are the most accurate obtainable and serve to define the actual lead concentration in each sample. Thus far, the reference laboratory mean values have shown excellent agreement with the NBS analyses. This agreement permits laboratories to retain survey samples for calibration purposes. Following each survey, CDC furnishes a report to each participant laboratory with an analysis of the survey results and a rating of the laboratory's individual results. Thus, each participating laboratory can relate

its performance to that of peer and reference laboratories.

CDC prepares and forwards quarterly a list of laboratories meeting the OSHA criteria to OSHA for verification. The list includes all laboratories that have met the OSHA requirement of a minimum of 8 out of 9 results (89 percent) within acceptable limits over 3 consecutive surveys. An updated "List of Laboratories Approved for Blood Lead Analysis" is circulated quarterly to OSHA's field offices for use in determining compliance with the lead standard in connection with workplace inspections. The list is available from the OSHA national office, regional offices, or field offices.

State Programs

Certain blood lead proficiency testing programs sponsored by State health departments may be considered equivalent to CDC's PbB-PT program if they meet the OSHA performance criteria and are subject to the same or similar participation requirements enforced by CDC. Eligible States are invited to submit information to OSHA for evaluation of their programs. Laboratories with satisfactory performance in State programs determined to be equivalent will be listed as approved for blood lead analysis if they are under *State* rather than *Federal* jurisdiction.

Participation and Consultation

OSHA and CDC encourage laboratories that serve industrial clients and wish to qualify for blood lead analysis to enroll, at no cost to the participants, in the blood lead proficiency testing program. Laboratories that apply for licensing through the Health Care Financing Administration and become certified to do blood lead analysis are automatically included in the program.

Consultation on CDC's PbB-PT

program, or on technical problems dealing with the various analytical methodologies, will be offered by CDC to the extent possible. CDC also conducts a limited number of onsite visits relative to problems in quality control, personnel, equipment, and performance when more intensive examinations appear to be necessary to correct deficiencies, as identified by survey results. Similar services may also be available from cooperating State PbB-PT programs.

Summary

The OSHA lead standard, 29 CFR 1910.1025, was established to protect the health of workers exposed to the hazards of lead. The standard lists specific requirements to ensure that blood lead analyses—critical indicators of workers at risk—be performed reliably by laboratories. Employers must use laboratories that meet OSHA performance criteria in blood lead proficiency testing programs monitored by the Centers for Disease Control and certain States. This proficiency testing requires that, as a minimum, laboratories must report the equivalent of eight out of nine samples within acceptable limits for the most recent three quarters or similar period. For compliance purposes, OSHA circulates to its staff a "List of Laboratories Approved for Blood Lead Analysis" each quarter.

NOTE: Further information on enrolling in the CDC program or concerning proficiency testing may be obtained from Dr. Joe Boone, Centers for Disease Control, Bureau of Proficiency Testing, Atlanta, Ga. 30333 (telephone 404: 329-3155). OSHA will respond to questions on laboratory performance requirements relating to compliance with the lead standard from field representatives, industry, and laboratories. Direct inquiries to Dr. Robert E. Donadio, U.S. Department of Labor, OSHA, Division of Occupational Health Programming, 200 Constitution Ave., N.W., Rm. N3608, Washington, D.C. 20210 (telephone 202: 523-8031).

PROGRAMS ■ PRACTICES ■ PEOPLE

"Health, United States, 1981" —Mortality Trends Improving

■ Health in the United States, as measured by mortality trends, continues to improve, according to the Department of Health and Human Services' sixth annual report to the Congress.

In the report, "Health, United States, 1981," selected issues of current concern are examined, and detailed statistics are provided on the nation's health status and resources. The report "Health, United States" is prepared annually by the National Center for Health Statistics and the National Center for Health Services Research.

The 1981 report shows that infant mortality declined to 13 deaths per 1,000 live births in 1979, while life expectancy at birth rose to 73.8 years. After virtually no change between the mid-1950s and the late 1960s, death rates for the elderly have been decreasing at an average rate of 2 percent a year. (The chart shows the decline among the elderly in stroke death rates.) The cancer death rate has been declining for people under age 50, and mortality from heart disease and stroke has been reduced among people of all ages.

However, lung cancer mortality continues to rise rapidly among women. The increase is greater than for men—reflecting women's later adoption of the smoking habit. The age-adjusted death rate for motor vehicle accidents has been rising after a substantial decline between 1973 and 1974. Deaths from this cause are particularly high for white men 15–24 years of age.

PREVENTING ILLNESS

The majority of adults 20–64 years engage in good health practices, but differentials exist, the report shows. Five practices that have been determined to be related to health status and longevity are sleeping 7 to 8 hours a night, limiting alcohol consumption, not smoking, being physically active, and controlling weight. About 40 percent of adults with 13 years or more of education follow at least four of these five practices, but only about 30 percent of adults with less than 12 years of education follow as many as four of these practices.

Further progress in reducing infant mortality and morbidity will require reduction in the incidence of low-birth-weight babies, according to the report. Although the proportion of low-weight births declined slowly in the 1970s, racial and socioeconomic differentials did not change significantly. Low-weight births occur more frequently to black mothers than to white mothers, to teenage mothers and mothers 35 and older, and to mothers with less than 12 years of education. Yet it is these high-risk mothers who are least likely to receive prenatal care early in pregnancy.

USE OF MEDICAL SERVICES

Income, race, and geographic differentials persist in the use of some health services, the report shows. Although use of certain preventive services increased in the 1970s, particularly in high-risk groups, low-income women still are less likely to receive Pap tests and breast examinations for cancer than are high-

income women. The marked trend toward equality among income groups in the use of physician services is not found in the use of dental services.

Ambulatory medical care utilization is considerably lower in nonmetropolitan areas than in metropolitan areas, although nonmetropolitan residents appear to be less healthy. White residents of nonmetropolitan areas have higher hospitalization rates than their counterparts in metropolitan areas. There are no differences in hospital use by residence for black adults, but hospital use is lowest for black children in rural areas. Because of the higher costs of hospitalization, an increase in the use of ambulatory care in nonmetropolitan areas could have beneficial effects on total health care expenditures, according to the report.

In a review of the nation's health resources, strong growth patterns were found for the major health professions. Physician and dentist supplies have grown more rapidly than population. However, geographic variations remain. The number of health maintenance organizations (HMOs) increased rapidly during the 1970s. In 1980, 37 States and the District of Columbia had at least one HMO, and the total enrollment reached 9.5 million people.

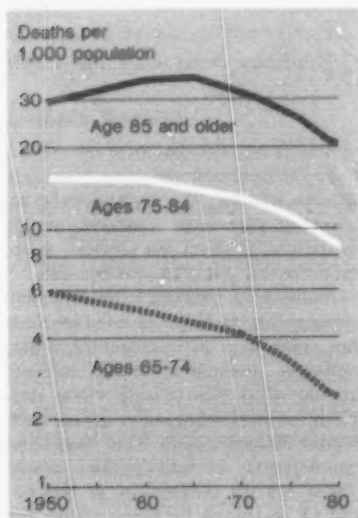
HEALTH SPENDING UP

National health expenditures reached \$247 billion in 1980, an average of \$1,067 per person. Because the nation's health care bill has been growing faster than the economy, national health expenditures have been claiming an increasing share of the Gross National Product (GNP). Health expenditures represented 9.4 percent of

the GNP in 1980, compared with 7.5 percent in 1970.

Hospital care expenditures continued to claim the largest share of the health care dollar—40 percent in 1980. Physicians' services accounted for 19 percent, and nursing home care for 8 percent.

Stroke death rates for the elderly



In the report, it is noted that rapid increases in health care expenditures are not unique to the United States. Other Western industrialized nations have experienced similar or greater increases in recent years.

Copies of the report "Health, United States, 1981," will be available for purchase from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402 in mid-March 1982.

New International Society Publishes Bulletin Entitled "Heart Transplantation"

■ The International Society for Heart Transplantation was created when a group of cardiologists and cardiac surgeons decided in 1981 to revive the Heart Transplantation Registry (formerly maintained by the National Institutes of Health), to exchange scientific experience, and to inform the medical community of progress in the field of heart replacement. The society publishes a bulletin, "Heart Transplantation," which is sent free of

charge to all members of the society. The first issue was distributed in October 1981.

Doctor Norman E. Shumway, pioneer and leader in heart transplantation, is the honorary president of the society. The president-elect for 1981-82 is Dr. Michael Hess of Richmond, Va., and for 1982-83, Dr. Jack G. Copeland of Tucson, Ariz. Cost of membership in the society for 1981-82 is \$30 in the United States and Canada and \$40 in other countries. Editorial and business correspondence should be sent to "Heart Transplantation," c/o Dr. J. G. Losman, MD, Editor, Michael Reese Hospital and Medical Center, 29th St. and Ellis Ave., Chicago, Ill. 61616.

High Blood Pressure Lowered Through Diet Management

■ Managing the diet is one of the most promising of the nonpharmacological approaches to controlling high blood pressure, which causes or contributes to nearly 800,000 deaths each year. Research suggests that weight loss and reduced sodium intake can help some people lower their blood pressure, especially those with mild elevations.

Recently, the National High Blood Pressure Education Program in the National Heart, Lung, and Blood Institute of the National Institutes of Health brought together a panel of experts in health education, nutrition, psychology, medicine, and nursing to define the critical patient behaviors in the dietary management of high blood pressure. The panel examined the patient and professional behaviors that help in achieving therapeutic control of hypertension through diet. In the panel's report, which is directed to professionals who counsel hypertensives in dietary management or who teach dietary counseling skills to health professionals, a 10-step counseling procedure is outlined for helping patients control sodium intake and weight.

"The Working Group Report on Critical Patient Behaviors in the Dietary Management of High Blood Pressure," NIH Publication No. 81-2269, August 1981, is available free from the High Blood Pressure Information Center, DM-B5, 120/80 National Institutes of Health, Bethesda, Md. 20205.

Access to Health Services by Elderly Varies According to Race

■ Race makes a difference as to where the elderly obtain health care and how long they wait for treatment. In a recently completed study by the staff of the National Center for Health Services Research (NCHSR), it was found that elderly blacks and Hispanics are just as likely as aged whites to have a regular source of health care, but the location of that care varies significantly by race. About 22 percent of the minority elderly get care at an institutional site, such as a hospital outpatient department, compared with about 7 percent of aged whites. Moreover, not having a regular source of care apparently diminishes treatment opportunities, especially for the minority aged. Study results show that only about 38 percent of the nonwhite elderly without a regular source of care see a health professional during the year, compared with 56 percent of their white counterparts. (In contrast, about 90 percent of the aged of all races with a regular source of care have a medical visit at least once a year.)

In addition, the study showed that the minority aged wait an average of nearly an hour before receiving medical treatment—much longer than younger minorities and whites of all ages. According to NCHSR investigators Amy Bernstein, MHSA, and Marc Berk, PhD, the study is one of the first to focus on such nonfinancial barriers to health care for the minority aged—barriers that may help explain some of the racial differences in health services use by the elderly. Study results were announced November 2, 1981, at the annual meeting of the American Public Health Association in Los Angeles.

Information on "Perceived Health Status and Selected Indicators of Access to Care Among the Minority Aged" is available from Bernstein or Berk, telephone 301: 436-8966, or write the National Health Care Expenditure Study, NCHSR, Rm. 8-50B, 3700 East-West Highway, Hyattsville, Md. 20782.

VA Literature Search Review Issued on Agent Orange

■ As part of the Veterans Administration's continuing effort to stimulate scientific inquiry on what effect, if any, herbicides used in Vietnam might have had on military personnel, a two-volume report on Agent Orange and other herbicides used in Vietnam is being distributed to researchers throughout government and the scientific community.

The report "Review of Literature on Herbicides, Including Penoxo Herbicides and Associated Dioxins" covers more than 20 years and includes some 1,200 documents. This literature search is expected to assist researchers in government and the private sector to identify opportunities for expanding their knowledge of herbicides based on what is already known and published.

Since 1978, the VA has examined some 65,000 veterans who have been concerned about the possible effects of having been in Vietnam during jungle-spraying operations that were carried out between 1962 and 1971. More than 10,500 of these veterans have filed claims for disability compensation with the VA based on a wide variety of medical symptoms or fear that such symptoms might develop.

Based on these claims, the VA set up a 15-member Advisory Committee on the Health Effects of Herbicides. The committee members are from the Centers for Disease Control, Armed Forces Institute of Pathology, Environmental Protection Agency, Food and Drug Administration, Department of Defense, Department of Agriculture, and the Occupational Safety and Health Administration, as well as from veterans organizations and medical schools.

The wide range of research on the subject that was undertaken throughout the government on the initiative of this committee led the White House to set up a coordinating mechanism—an inter-agency Working Group on Agent Orange. Chaired by the Department of Health and Human Services, this group has recently been elevated to cabinet council status.

Many studies are currently being conducted by both government and nongovernment scientists, including a

study on the current health of some 1,200 air crew members who were known to have been exposed to herbicide orange while they were loading and spraying it; an epidemiologic study of Vietnam veterans being designed by the University of California at Los Angeles School of Public Health; a study of birth defects by the Centers for Disease Control; followups on a number of industrial accidents that have resulted in heavy exposure of workers to herbicides; and a wide range of private research funded by government grants through the Veterans Administration and the Department of Health and Human Services.

Persons and organizations involved in related research may obtain copies of the two-volume report from the Office of Environmental Medicine, Rm. 848, Veterans Administration, 810 Vermont Avenue, NW., Washington, D.C. 20420.

Educational Videocassettes to Aid in Early Detection of Malignant Melanoma

■ Scientists at the National Cancer Institute (NCI) and the Pigmented Lesion Clinic, Hospital of the University of Pennsylvania, have identified a new syndrome, the dysplastic nevus syndrome. People with this syndrome have unusual moles (dysplastic nevi), a small fraction of which have been shown to progress to the skin cancer known as melanoma. These unusual moles were discovered in members of melanoma-prone families. Members of such families who have these moles are at increased risk of melanoma. The identification of these moles also in patients with sporadic (nonfamilial) melanoma suggests that these precancerous lesions are more prevalent in the general population than previously estimated. Careful surveillance of patients with the dysplastic nevus syndrome has led to early diagnosis of melanomas at a time in their natural history when they are surgically curable. Surgical removal of the most abnormal of these atypical moles can prevent progression to melanoma in persons at high risk of the disease.

To help health professionals recognize and manage patients at increased risk of melanoma, NCI investigator Dr.

Mark H. Greene and his colleagues have prepared a series of educational videocassettes. These materials illustrate the unique clinical and histological characteristics of dysplastic nevi; indicate how to recognize early melanoma; present the melanoma warning signals, the principles of skin examination, and ways to minimize exposure to sunlight; and offer recommendations for daily health care.

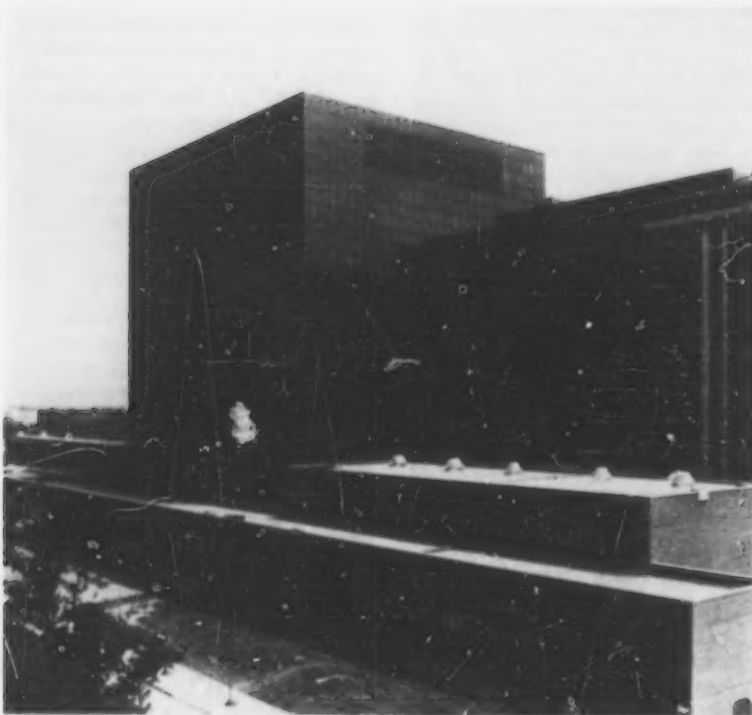
The ¾" videocassettes—Control and Prevention of Malignant Melanoma: A Program for Melanoma-Prone Families, Title #A04349, \$65, 27 minutes; Dysplastic Nevi and Melanoma: A Program for Pathologists, Title #A04351, \$65, 26 minutes; and Dysplastic Nevi and Melanoma: A Program for Clinicians, Title #A04564, \$95, 58 minutes, may be purchased by sending a check (payable to National Audiovisual Center) to Attention: Order Section, National Audiovisual Center, General Services Administration, Washington, D.C. 20409, or the cassettes may be borrowed (for 7 days) from the Modern Talking Picture Service, Inc., Film Scheduling Center, 5009 Park St. North, St. Petersburg, Fla. 33709.

Written information on the prevention and early detection of melanoma in persons at high risk may be obtained from the National Cancer Institute, Office of Cancer Communications, Bldg. 31, Rm. 10A18, Bethesda, Md. 20205.

Life of Sir William Osler Available on Videotape from National Library of Medicine

■ A videocassette on the life of Sir William Osler, physician, teacher, and major contributor to the humanistic approach in the practice of medicine, has been produced by the National Library of Medicine's National Medical Audiovisual Center. The 33-minute, ¾" videocassette can be borrowed from the NMAC through one's own library by using the American Library Association's inter-library loan form. Include the title, "The Palpable Osler," and the number (WZ100VC No. 32 1981) in the request and send to Materials Utilization Branch, National Medical Audiovisual Center, 8600 Rockville Pike, Bethesda, Md. 20209.

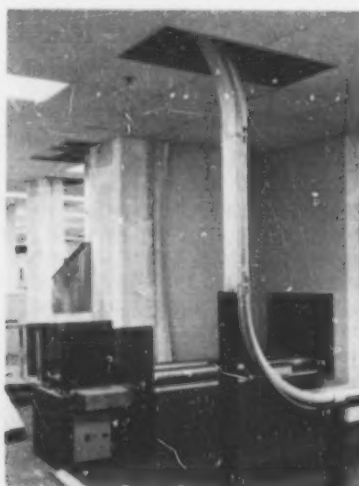
New Facility Dedicated at National Institutes of Health



The new 14-story Warren Grant Magnuson Clinical Center of the National Institutes of Health



The new lobby gives the appearance of an open and breezy area way



Tote boxes on tracks carry specimens, blood, and supplies to other departments

■ The Warren Grant Magnuson Clinical Center and its wing, the Ambulatory Care Research Facility (ACRF), at the National Institutes of Health (NIH) were dedicated on October 22, 1981. The new \$100 million 13-floor facility, which will provide ambulatory care to thousands of outpatients in a research setting, was named after the former Senator from Washington.

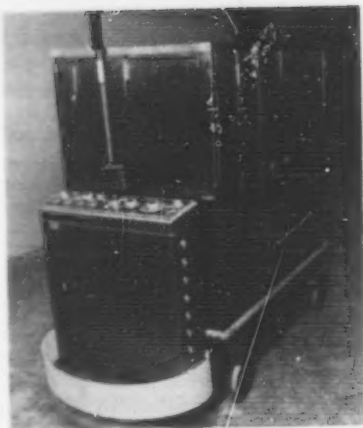
Although Magnuson was unable to be present at the dedication, a message from him was read at the ceremony. As chairman of the Subcommittee on Labor-HEW of the Senate Committee on Appropriations (which had full jurisdiction over NIH), and later as chairman of the full committee, he championed continuing programs of health care and health research. His commitment to the idea that the conquest and prevention of disease, as well as progress in health care, depends upon research, is noted in a plaque that greets visitors as they enter the new building.

With its glass tower, skylights, open waiting rooms, large amphitheater, operating rooms, and clinics, the new building is expected to accommodate 200,000 patient visits yearly. The facility does not replace the existing Clinical Center, which opened its doors in Building 10 more than 28 years ago. The older building will continue to house some 7,500 patients each year. The design of the new building allows scientists to work closely with the patients on the floors, since the clinics are located near the research areas. In-house patients are easily accessible to the researchers by a connecting walkway.

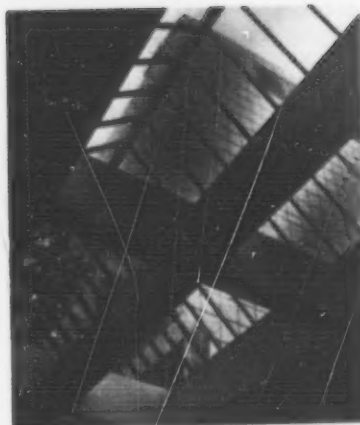
The ACRF was built as part of a modernization and expansion program designed to strengthen the combined laboratory and patient care activities of the NIH Clinical Center. It is equipped to handle more than double the number of outpatients seen in NIH clinics each year. At the same time it will provide for expanding laboratory research to support the outpatient clinic program. Also, the ACRF will allow performance of many more noninvasive procedures on an ambulatory or outpatient basis.

The new building has three underground floors for parking. An open-spaced lobby, complete with skylights and plants, serves as the NIH Visitors Center and exhibit area, theater, and model laboratory. On the first floor is an admissions section for outpatients to check in and report to the clinics. The Clinical Pathology Department located on the second floor is designed to accommodate 200 people. The Diagnostic Radiology and Nuclear Medicine Departments will move to the first floor of the ACRF from Building 10 sometime in 1982.

Floors 3 to 13 are designed alike. Each floor will have clinic rooms, laboratories, and isolated animal areas. Walkways on each floor give easy access to Building 10's Clinical Center.



Automated "robots" deliver supplies to the new clinics and offices



The 13-story glass tower is seen through the lobby's skylight



The Clinical Pathology quarters are almost the size of a large football field. The "doggie-bone" laboratory areas will house 200 employees

Chimpanzee Antibodies: Potential New Weapon Against Human Cancer

■ Medical research with chimpanzees at Emory University's Yerkes Regional Primate Research Center in Atlanta, Ga., is helping scientists devise new approaches to diagnosing and treating people with melanoma, leukemia, and pancreatic cancer.

The research has produced a potentially effective method of diagnosing melanoma, a form of cancer that is the leading cause of death from all diseases arising in the skin. Preliminary clinical testing at Duke University, Durham, N.C., indicates that this new diagnostic tool may be faster and more precise than conventional methods for detecting melanoma.

In a related development, a new treatment for leukemia, pancreatic cancer, and melanoma is expected to be ready for clinical evaluation within several years. As in the diagnostic tool for melanoma, use is made of antibodies produced by the immune system of chimpanzees in response to antigens that have been removed from the surface of human cancer cells. (Antigens, which are present on all cells, are markers that allow the immune system to tell the difference between body cells, which do not present a threat, and foreign materials, which do.)

"The antigen systems of chimpanzees and humans are very similar," explained Dr. Richard Metzgar, who is conducting the research at the Yerkes Center with Dr. Hilliard Seigler. Metzgar is a professor of immunology and Seigler is a professor of surgery at Duke University. Because of the apparent similarity of the antigen systems, the antibodies produced by a chimpanzee to human cancer cells are almost identical with the antibodies that the immune system of a healthy person would manufacture against the same cancer cells. Like human antibodies, chimpanzees' antibodies are programmed by their immune system to attack a particular virus, bacteria, or other disease-causing organism. Thus, when immunized with antigens from the melanoma or other human cancer cells, the chimpanzee's immune system produces antibodies which react only to that form of cancer.

"The chimpanzees do not develop cancer when they are injected with human cancer antigens," Metzgar pointed out. "But their bodies' immune system strongly reacts by producing antibodies against human cancer." Metzgar and Seigler extract these anti-cancer antibodies from the chimpanzees' blood serum and study them as tools for the diagnosis and treatment of human cancers.

Seigler conducts the diagnostic test in Duke University's laboratories. Tumor cells taken from human patients are exposed in the laboratory to chimpanzee blood serum containing anti-cancer antibodies. By using a variety of laboratory tests, Seigler can determine if the chimpanzee's anti-melanoma antibodies bind to the patient's tumor cells. Occurrence of this binding reaction indicates that the patient's tumor cells are melanoma.

Metzgar's research is focused on the use of chimpanzee anticancer antibodies to treat human patients who have leukemia, melanoma, lymphoma, and pancreatic cancer. Like Seigler's work, the research is conducted at both the Yerkes Center and Duke University. Metzgar theorizes that the anti-cancer antibodies of chimpanzees, once injected into the human body, could be capable of searching out and destroying cancer cells in a human patient without harming the patient's healthy cells.

Because the chimpanzee's immune system produces a variety of antibodies and harvesting only the ones against cancer is difficult, Metzgar uses recently developed procedures that enable scientists to produce large quantities of identical (monoclonal) antibodies. Antibody-producing cells (B-lymphocytes) from chimpanzees are sensitized to antigens from a specific cancer. They are then fused with human cancer cells to form hybridomas. Each hybridoma, when cloned, manufactures large amounts of a single type of antibody programmed to search out and attack the cancer to which the lymphocytes were sensitized.

Immunizing or injecting human patients with these monoclonal human-chimpanzee antibodies should be safe for the patient, said Metzgar. "The monoclonal antibodies should not trigger a harmful reaction in human patients," he explained, "because these antibodies are so much like antibodies produced by the human system."

Private Practice Option Speeds Physician Placement in Areas Short in Health Manpower

■ More than 422 scholarship recipients of the National Health Service Corps (NHSC) have been matched under the Private Practice Option (PPO) with either freestanding private practices, salaried positions with institutions, clinics, or private practices or matched with grant-funded positions.

Rural placements outstripped urban placements by 259 to 163, with Department of Health and Human Services Region V placing the largest number of PPO professionals—97.

More than half of Region IV's placements were in the 01, or greatest need, categories. The region having the highest percentage of its placements in the 01 category was Region III—nearly two-thirds of its 69 matches. Region III was second to Region V in total number of placements.

Other regions in which the PPO was highly popular included Region IV with 60 matches and Region IX with 45.

Although it is too soon to know how effective the Private Practice Option will be in achieving the National Health Service Corps' mission of helping health professional locate and remain in shortage areas, initial results are encouraging.

Alcoholism Services To Be Tested in Nonhospital Settings

■ The Health Care Financing Administration (HCFA) and the Office of Management and Budget have approved a 4-year demonstration project in which seven "umbrella" organizations will test the feasibility and effectiveness of providing alcoholism services under Medicare and Medicaid in lower cost nonhospital settings.

An interagency agreement between the National Institute on Alcohol Abuse and Alcoholism (NIAAA) and HCFA authorizing and funding the project was signed in September 1981. Alcohol, Drug Abuse, and Mental Health Administrator William Mayer said: "We are hopeful that the demonstration will add significantly to our knowledge of how we can most effectively use non-physician personnel in providing alco-

holism treatment services in these major health programs. We also hope it will show how to design the most effective outreach programs, and what specific revisions should be made in current Medicare and Medicaid legislation that can result in lower cost and higher quality services to alcoholic persons."

The memorandum of agreement states that NIAAA will transfer up to \$1.1 million per year to HCFA in fiscal years 1982-85—subject to the availability of funds appropriated by the Congress—to cover the administrative and evaluation costs of the demonstration. In addition, NIAAA will transfer to HCFA, subject to the availability of funds, an agreed-upon amount sufficient to cover evaluation costs in fiscal year 1986.

Each of the seven grantees will study 12 to 18 treatment providers. The grantees are seven State agencies of Arkansas, Connecticut, Georgia, Illinois, Michigan, New Jersey, and New

York and the American Indian Institute of the University of Oklahoma. The providers were chosen according to a ratio of three outpatient facilities, two halfway houses, and one freestanding inpatient facility. The agencies will oversee the providers' operations, data gathering, and reimbursement activities. They also will provide needed training in claims processing and data gathering.

Projected savings from the 4-year demonstration are estimated at \$20.8 million in Medicare and Medicaid reimbursements, based on the difference between the cost of services in a traditional medical setting and the cost in the demonstration settings.

The demonstration's goals include testing the potential value of providing payment for services to Medicare and Medicaid eligibles in freestanding settings; evaluating the performance of nonphysician personnel (including counselors) in such settings; and testing treatment services.

The grantees will assess the cost and effectiveness of treatment services in nonhospital settings as compared with matched sites, retrospective data, and related studies, as well as establish a basis for potential legislative, regulatory, and policy changes to achieve the most cost-effective alcoholism treatment for Medicare and Medicaid recipients.

Uniform benefits will be provided for alcohol detoxification, with no limits on episodes; in-patient treatment up to 30 days a year; and outpatient treatment up to 45 days per year. The lead project officer for the demonstration is Dr. Andrew Solarz, Office of Research, Demonstration, and Statistics, HCFA. The associate project officer is John Noble, Acting Director, NIAAA Division of Alcoholism Services Development.

A 3-day training workshop with the grantee agencies was held December 2-4, 1981.

—JAMES DOHERTY, NIAAA

One-Sixth of 1980 U.S. Births by Cesarean Section

■ For our paper "Trends in Cesarean Section Rates for the United States, 1970-78" in the November-December 1980 issue of PUBLIC HEALTH REPORTS (pp. 540-548) and for our update entitled "U.S. Cesarean Section Rate Rises Higher in 1979" in the July-August 1981 issue (p. 380), we used 1970-79 National Hospital Discharge Survey (NHDS) data collected by the National Center for Health Statistics to study variations in the cesarean section delivery rate. We found that C-sections comprised 5.5 percent of all deliveries in 1970, but rose steadily to comprise 16.4 percent of all deliveries in 1979. We concluded that a fundamental and widespread

change in obstetrical practice appeared to have taken place, since there was a uniform increase in C-section rates within all regions, for women of all ages, for all marital statuses, for all hospital sizes, and for all types of hospital ownership.

Because of the increased concern expressed by the medical community over the rising rate, and because 1980 NHDS data have become available, we wanted to see if the upward trend had abated. In 1980, 16.5 of every 100 deliveries (or 16.5 percent) were C-section—1 of every 6 deliveries in the United States (see table). For practical purposes, this figure (particularly because of the lack of statistical significance) thus represents no measurable change from the 1979 rate of 16.4. However, the age component of

the overall rate may deserve particular attention since, for example, 14.5 of every 100 births to mothers under 20 years of age are now by C-section. Three-fourths of these teenage births are first births, and nearly all of the second and later births to follow will therefore also be by C-section. In addition, the maternal and fetal complications that are indications for C-section may occur more frequently with increasing maternal age, so that some mothers whose earlier babies were vaginally delivered will subsequently have C-section deliveries. Thus, there may be a "statistical momentum" built into the C-section rate. The continued diffusion of electronic fetal monitoring technology may add further stimulus to this phenomenon. On the other hand, the fact that the rate of increase has abated and that the attention of the medical community has been focused on the C-section rate may point to the rate having reached its peak.

For further information, contact Paul J. Placek, PhD, or Selma M. Taffel, Division of Vital Statistics, National Center for Health Statistics, 3700 East-West Hwy., Rm. 1-44, Hyattsville, Md. 20782 (telephone 301: 436-8954).

—PAUL J. PLACEK, PhD, and
SELMA M. TAFFEL

Cesarean section rates for non-Federal short-stay hospitals in the United States and each region, 1980, by age of mother

Area	Age of mother (years)						
	All ages	Under 20	20-24	25-29	30-34	35-39	40 and over
United States	16.5	14.5	15.8	16.7	18.0	20.4	21.2
Northeast	19.2	16.9	19.2	19.6	17.6	28.7	(¹)
North Central	14.9	13.7	13.0	14.9	18.3	18.9	(¹)
South	16.8	14.5	17.5	17.1	16.8	18.1	(¹)
West	15.3	13.5	13.7	15.5	19.6	(¹)	(¹)

¹ Figure did not meet standards of reliability or precision (based on weighted sample of 5,000 or less).

NOTE: Rates are number of cesarean sections per 100 deliveries.

Deficiencies in Studies of Cost of Illness Revealed in NCHSR-Funded Review

■ Omission of many potentially significant costs—particularly psychosocial costs—is a common methodological flaw in cost of illness studies, according to a state-of-the-art review funded by the National Center for Health Services Research. Other deficiencies pinpointed by the review include the failure to estimate both the direct and indirect costs of illness as well as significant variations in data and assumptions among researchers. These in turn make comparisons of cost estimates across studies difficult.

Despite such problems, the methods and data associated with estimating illness costs are relatively good overall and provide an adequate foundation for policymaking and future research, concluded investigators Dr. Teh-wei Hu, Pennsylvania State University, and Frank H. Sandifer, Georgetown University. Their comprehensive state-of-the-art review, covering 250 studies in 13 major areas, is now

available in 14 volumes from National Technical Information Service (NTIS), 5258 Port Royal Rd., Springfield, Va. 22161.

In the main report, the project's scope, methodologies, and recommendations are discussed. Separate appendixes give a cost review of illness studies by 13 major disease groupings. Each appendix includes a narrative discussion of the studies dealing with the particular disease category (usually accompanied by tabular presentations), a summary for quick reference, and individual abstracts. The 14 volumes are as follows.

- "Synthesis of Cost of Illness Methodology," Final Report, PB82-125055, \$12
- "Infective and Parasitic Diseases," Appendix A, PB82-125063, \$13.50
- "Neoplasms," Appendix B, PB82-125071, \$14.50
- "Endocrine, Nutritional, and Metabolic Diseases," Appendix C, PB82-125089, \$9
- "Mental Disorders," Appendix D, PB82-125097, \$19.50
- "Diseases of the Nervous System

and Sense Organs," Appendix E, PB82-125105, \$7.50

- "Diseases of the Circulatory System," Appendix F, PB82-125113, \$15
- "Diseases of the Respiratory System," Appendix G, PB82-125121, \$9
- "Diseases of the Digestive System," Appendix H, PB82-125139, \$12
- "Diseases of the Genitourinary System," Appendix I, PB82-125147, \$12
- "Diseases of the Musculoskeletal System and Connective Tissue," Appendix J, PB82-125154, \$7.50
- "Congenital Anomalies," Appendix K, PB82-125162, \$7.50
- "Certain Causes of Perinatal Morbidity and Mortality," Appendix L, PB82-125170, \$7.50
- "Accidents, Poisonings, and Violence," Appendix M, PB82-125188, \$12.

All 14 volumes may be purchased as a set for \$141.50, PB82-125048. Microfiche is also available of all volumes for \$4 for the set. Orders should specify the complete title of the study, the title of the appendix wanted, and the PB number.

Family Structure and Stress Are Found to Be Related to Psychotropic Drug Use

■ Family-related characteristics and stresses are among the reasons that women are twice as likely as men to use antidepressants, sedatives, antipsychotics, and anti-anxiety agents.

In a recent study, researchers from the National Center for Health Services Research (NCHSR) found that psychotropic drugs are taken most frequently by women who head one-parent families and women who live in "traditional nuclear families." (The second group of women live with a wage-earner husband or children and either do not work or else work only if their children are more than 5 years old.) Single women living alone and women with a sick spouse also head the list of psychotropic drug users. Interestingly, women who work when one or more of their children are under 5 are significantly less likely to use psychotropic medications than women in other family situations.

Men, as a group, were found to be less likely than women to take psychotropic drugs. However, men appear to be particularly affected by a death

in the family, as measured by their drug use, whereas women are not. The birth of a child is associated with low levels of psychotropic drug use for both men and women. In general, both sexes are more likely to use such drugs when they are older, in poor health, or limited in activity, it was found.

Patterns of psychotropic drug use may be due in part to the medical system, since physicians may prescribe more of those medications for women than for men with similar complaints. Also, the greater likelihood that women will seek medical care when undergoing stress may account for their increased psychotropic drug use, explained study leader Gail Lee Cafferta, PhD.

The study results were announced November 3, 1981, at the annual meeting of the American Public Health Association in Los Angeles. Information on "Family Structure, Stressors, and the Use of Psychotropic Drugs" is available from Cafferta, Amy Bernstein, MHSA, and Judith Kasper, PhD; telephone (301: 436-8966) or write the National Health Care Expenditures Study, NCHSR, Rm. 8-50B, 3700 East-West Highway, Hyattsville, Md. 20782.

Forecasting Model of Bureau of Health Professions Described in New Publication

■ The Health Resources Administration's Bureau of Health Professions has published a report that describes the main forecasting model currently used by the Bureau to project requirements for health professionals.

In the model, population is separated into 40 subgroups characterized by the attributes of age, sex, and family income. Twenty categories of health services are covered in the model as well as 28 types of health personnel who provide these services.

The model's forecasts of requirements reflect both population growth and its redistribution and anticipated changes in per capita utilization based on recent experiences. Factors affecting utilization trends include out-of-pocket costs of health services for the consumer, changes in the incidence of illness and conditions, and evolving attitudes toward particular types of care.

The model also allows for potential developments that could alter forecasts of requirements, such as national

health insurance, health maintenance organizations, expanded roles for mid-level health practitioners, and technological advances.

The report provides the technical documentation for the projections to 1990 as presented in the 1980 report to the Congress on the status of health professions personnel in the United States.

The Health Professions Requirements Model: Structure and Application, DHHS Publication No. (HRA) 81-15. Single copies available free from the Bureau of Health Professions, Room 4-44, Center Bldg., 3700 East-West Highway, Hyattsville, Md., 20782.

U.S. Nurse Supply Projected to Rise to 1.7 Million in 2000

■ The nation's supply of active registered nurses is projected to rise from 1.1 million in January 1980 to 1.5 million in 1990 and to 1.7 million in the year 2000, according to the sixth edition of the "Source Book—Nursing Personnel," recently published by the Health Resources Administration's Bureau of Health Professions.

In addition to supply projections, the source book contains historical and current statistics on nursing personnel, including estimates of the active nurse supply and the distribution of nurses by field of employment, educational preparation, geographic distribution, and a variety of other characteristics.

According to the source book, the number of nurses working on a part-time basis rose sharply in the 1960s. About 18 percent of the total supply of nurses were working part time in 1960; by 1970, this proportion had risen to 28 percent. In 1980, part-time registered nurses represented some 31 percent of the active RNs. Hospitals, nursing homes, and related institutions have remained the predominant employers of registered nurses, and since 1962, two of every three RNs have been employed in these fields.

Increasing numbers of registered nurses have continued their formal education beyond their initial preparation. In 1952, an estimated 8.2 percent had achieved a baccalaureate or higher academic degree. In 1970, the proportion holding baccalaureate and

higher degrees was 14.9 percent. By 1980, this proportion is estimated to have increased to 25.5 percent.

Statistics from a variety of sources on the age, sex, racial or ethnic background, and other characteristics of nursing personnel are presented in the publication. Most of the statistics are based on the inventories of registered nurses and licensed practical nurses compiled by the American Nurses' Association. The publication also includes data from the Bureau of the Census and special studies such as the National League for Nursing's Nurse Career-Pattern Study and the 1977 National Sample Survey of Registered Nurses. In addition, a special study in which the 1970 census data on registered nurses was evaluated is summarized in the source book.

One chapter in the 215-page report focuses on the development and growth of nursing education in the United States, providing data on educational programs, students, and graduates. Another chapter includes statistics on employment in the major nursing employment settings as well as salary information and staffing ratios.

Single copies of the "Source Book—Nursing Personnel," DHHS Publication No. (HRA) 81-21, may be obtained from the Bureau of Health Professions, Room 4-41, Center Building, 3700 East-West Highway, Hyattsville, Md. 20782.

—ADELE M. MILLER, Information Officer, Bureau of Health Professions, Health Resources Administration

1980 Occupational Injuries and Illnesses

■ The overall job-related injury and illness rate in the U.S. private sector declined in 1980. According to statistics prepared by the Bureau of Labor Statistics of the U.S. Department of Labor, about 1 injury or illness occurred for every 12 workers during 1980, whereas in the previous 4 years, the ratio was 1 of 11.

About 5.47 million work-related injuries occurred in 1980, down from 5.96 million in 1979. Records show that some 130,200 recognized occupational illnesses were reported in 1980 compared with 148,900 in 1979. Work-related deaths in units with 11 or more employees also fell—from 4,950 to 4,400 in 1980.

INJURIES

Injuries involving lost worktime dropped from 2.7 million in 1979 to 2.5 million in 1980. About 40.9 million lost workdays resulted from work-related injuries, down from 42.6 million in 1979. The number of lost workdays per 100 full-time workers fell from 66.2 to 63.7. However, the average number of lost workdays per injury involving lost workdays remained at the 1979 level—16 days. Mining was the only industry to show an increase in lost workdays. Injury rates continued to be highest for establishments with 100 to 249 employees.

ILLNESSES

As in previous years, skin diseases or disorders continued to account for the majority of illnesses—about 4 of every 10 cases, largely because they are so observable. Even though 130,200 occupational illnesses were reported in 1980, the recording and reporting of illnesses continue to present some measurement difficulties, since employees (and physicians) often are unable to recognize some illnesses as work-related.

SOURCES OF DATA

These data on injuries and illnesses come from the Annual Occupational Injuries and Illnesses Survey, a Federal-State program in which reports are received and processed by State agencies participating in the survey with the Bureau of Labor Statistics. The 1980 survey, response to which was mandatory, involved a sample of 280,000 units in the private sector. The occupational fatality data reported through the annual survey are based on the records that employers maintain under the Occupational Safety and Health Act of 1970.

legal note

Improper Release of Patient from Hospital

A Florida appeals court held that the doctrine of sovereign immunity did not bar a suit against the State alleging that a State hospital negligently released an involuntarily committed patient before he was sufficiently treated and cured, causing injury to a third party. *Bellavance v. State of Florida*, 390 So.2d 422 (Fla. App. 1980).

Ever since the California Supreme Court in *Taresoff v. Regents of the University of California*, 551 P. 2d 334 (Cal. 1976), found that a psychotherapist had a duty to warn third parties of reasonably foreseeable danger arising from a patient's violent tendencies, there has been increasing attention given to the liability issues surrounding patient care. One line of cases in this area involves the liability of governmental entities for negligently releasing mental patients in the community when such release results in injury to the patient or others. This case involves the liability of the State of Florida for injury to a third party because of the negligent release by a State hospital of an involuntarily committed patient.

The patient, Gary Riccardelli, had been involuntarily committed to the Northeast Florida State Hospital under Florida's Baker Act immediately following his release from prison. During his stay in prison, Riccardelli had a long and troubled history of fights and other violent acts and, while in the hospital for only 2 months, tried to escape twice. The patient was released from the hospital on December 25, 1976, even though the staff had subjected him to "homicidal precautions" as recently as December 10, 1976. Plaintiffs Norman and Paul Bellavance brought suit against the State of Florida alleging that, following his release, the patient injured Paul Bellavance causing loss to both Paul and his

father, Norman, and that this injury was due to the State's negligent release of the patient before he was properly treated and cured.

The only issue before the appellant court was whether the suit should have been dismissed because of the State's sovereign immunity. The court decided dismissal was not justified.

WAIVER OF IMMUNITY

Historically, the Federal and State governments were immune from tort liability arising from activities which were governmental in nature. However, most jurisdictions have abandoned this doctrine by permitting suits in limited situations. A Florida tort claims statute waives sovereign immunity except for certain "discretionary" governmental functions. The Florida Supreme Court described four factors to consider in determining whether an alleged wrongful act fell within a government's discretionary function:

1. Does the act involve a basic governmental policy?
2. Is the act essential to the accomplishment of the policy or just peripheral?
3. Does the act require the exercise of a basic policy judgment on the part of the governmental entity involved?
4. Does the governmental entity possess the proper authority to perform the act?

If all of these questions are answered in the affirmative, the challenged activity is most likely within the government's discretionary functions and, thus, the responsible entity would be immune from liability.

The court found the answers to questions 1 and 4 affirmative in that the act of releasing a mental patient clearly involves the basic governmental policy set forth in the Baker Act "to seek the least restrictive means of intervention and treatment for the particular patient" and that the State hospital had the necessary authority to release the patient.

In answering questions 2 and 3 in the negative, the court reasoned that the release of Riccardelli was not essential to maintenance of the Baker Act policy favoring least restrictive means of treatment and that, although the State's standards for releasing mental patients might be discretionary, the act of releasing Riccardelli under those standards did not achieve the status of a basic policy evaluation. Concluding that consideration of these four questions did not clearly support application of the sovereign immunity doctrine, the court determined that additional analysis was needed on whether the State should be immune from suit in this instance.

EFFECT OF STATE POLICY

The court described the policy behind the Baker Act, the Florida commitment statute, as one favoring the least restrictive means of treatment for the individual patient. In deciding whether the release of Riccardelli involved a discretionary function and, thus, immunity from suit, the court was concerned whether "to subject the State to liability for the negligent release of . . . [mental patients] will have a chilling effect" upon the State

policy to "secure the earliest possible release and subsequent return to society of persons afflicted with mental illness." The court concluded that this potential chilling effect was limited because of a provision in the Florida tort claims act restricting the liability of the State's employees for negligence ("No officer, employee, or agent of the state . . . shall be held personally liable in tort . . . as a result of any act, event, or omission of action in the scope of his employment or function, unless . . . [he] acted in bad faith or with malicious purpose or in a manner exhibiting wanton and willful disregard of human rights, safety, or property").

Further, the court stated its doubt "that the potential liability of the State itself will be a significant inhibitor to the exercise of professional judgment by the personnel involved. Indeed, some inhibiting effect may well be healthy, for it should not be forgotten that the State's employees serve the needs of society as a whole as well as the needs of individual persons."

At the end of its analysis, the court concluded "[i]n sum, the equities of the instant factual situation do not present a compelling justification for the invocation of sovereign immunity."

IMPLICATION OF THE RULING

The court found that the doctrine of sovereign immunity did not protect the State of Florida from tort actions by injured third parties for the negligent release of mental patients. The precedential effect of this decision by a Florida appellate court is limited to that State. Courts in other jurisdictions which have considered this and similar questions have split on whether the governmental entity should be subject to liability, although in some instances the cases turn not on

the issue of sovereign immunity but on some other ground, such as whether a duty exists to protect against the harm caused by the negligent release. For cases holding that the governmental entity may be held liable, see *Maroon v. Indiana Department of Mental Health*, 411 N.E.2d 404 (Ind. Ct. App. 1980) (escape of mental patient); *Leverett v. Ohio*, 399 N.E.2d 106 (Ohio Ct. App. 1978); *Payton v. United States*, 636 F. 2d 132 (5th Cir. 1981), rehearing en banc granted, 649 F. 2d 385 (1981) (release of psychotic prisoner on parole); *Lipari v. Sears, Roebuck & Co.*, 497 F. Supp. 185 (D. Neb. 1980). For cases finding that liability should not be imposed, see *Thompson v. County of Alameda*, 614 P. 2d 728 (Cal. Sup. Ct. 1980) (release of juvenile on parole); *Neal v. Donahue*, 611 P. 2d 1125 (Okla. Sup. Ct. 1980) (release of juvenile); *Ellis v. United States*, 484 F. Supp. 4 (D.S.C. 1978); *Heifetz v. Philadelphia State Hospital*, 393 A. 2d 1160 (Pa. Sup. Ct. 1978) (case has been refilled following abolishment of Pa. sovereign immunity); *Leedy v. Hartnett*, 510 F. Supp. 1125 (M.D. Pa. 1981) (discharge of voluntary patient).

In those jurisdictions which allow governmental liability, what implications might this have for public policies favoring treatment of mental patients in the community? The answer to this question is, of course, speculative but the court in *Bellavance* reasoned that the partial immunity from personal liability provided by the Florida tort claims act would diminish any negative impact of State liability on the policy favoring patient release at the earliest possible date. As the laws which apply to the Federal Government and many other states also limit employee liability, applying this reasoning in other jurisdictions would

suggest a limited impact on policies favoring community treatment.

It seems reasonable to assume that this protection from personal liability would help insulate the governmental employee from any direct concern over personal financial loss from *Bellavance* type lawsuits. However, there is less reason to agree with the court's conclusion that "the potential liability of the State itself will [not] be a significant inhibitor to the exercise of professional judgment by the personnel involved." There is little doubt that few mental health professionals wish to be involved in a lawsuit in which their judgment is at issue. It also seems likely that governmental liability will lead to institutional procedures or pressures which will cause employees to be more timid in discharging patients. Even without personal liability, it is unlikely a governmental employee would willingly jeopardize his career by acting against the best interests of his employer. Thus, the rise of *Bellavance* type lawsuits may threaten public policies favoring community treatment of the mentally ill by making public hospitals generally less willing to release mental patients early because of the liability that may arise if they erroneously release patients who are dangerous and commit harm to third parties. (At least one court apparently agrees with the view that the prospect of liability will lessen the likelihood of release, although the question considered by that court concerned the liability of court-appointed psychiatrists and not the State. See *Seibel v. Kemble*, 631 P. 2d 173 (Hawaii Sup. Ct. 1981).

—CHRIS B. PASCAL, Senior Attorney,
Office of the General Counsel, Department of Health and Human Services

education notes

Health Executive Development Program. Approximately 30 speakers, all professionals in the health care field, will discuss the latest trends and issues in health policy, planning, regulation, and management at the Health Executives Development Program's 1982 silver anniversary session to be held at Cornell University's Ithaca campus, June 14-24, 1982.

A variety of views will be presented to stimulate each participant to seek fresh approaches to health services problems and to lay the groundwork for continuing self-development. Participants will include professionals from hospital administration, public health, health planning and regulatory agencies, and clinical and medical administration, as well as executives from other health care organizations in the United States, Canada, and overseas.

For further information and applications, contact Health Executives Development Program, Graduate School of Business and Public Administration, Malott Hall, Cornell University, Ithaca, N.Y. 14853, or call 607: 256-4686.

Graduate summer session in epidemiology. The 1982 graduate summer session in epidemiology will be offered at the University of Minnesota in Minneapolis, June 20 to July 10. It is sponsored by the Epidemiology Section of the American Public Health Association, the Association of Teachers of Preventive Medicine, and the American College of Preventive Medicine, through the University's Division of Epidemiology, School of Public Health, and Depart-

ment of Conferences, Continuing Education, and Extension.

These summer graduate sessions are designed primarily for teachers in medical schools, but postdoctoral fellows, graduate students, and residents in departments of preventive medicine and other medical school departments may qualify. Similarly, teachers, postdoctoral fellows, and graduate students in schools of public health, dentistry, and veterinary medicine are eligible, as are qualified personnel of Federal, State, and local health agencies. The course is accredited (category 1) for the American Medical Association's Physicians Recognition Award.

In general, the summer session in 1982 will follow the pattern previously established. In addition to the two basic courses in Fundamentals of Epidemiology and Fundamentals of Biostatistics, several of the previously presented courses will be offered. These include Epidemiology of Infectious Diseases, Surveillance and Control of Communicable Diseases, Hospital Epidemiology and Infection Control, Epidemiology of Cancer, Epidemiology of Cardiovascular Diseases, Environmental Epidemiology, Diseases Due to Drugs and Other Therapies, and Occupational Epidemiology. Also, two new courses, Epidemiology of Alcoholism and Analysis of Quantitative Data in Epidemiology, will be offered. This year's schedule of classes will be structured so that interested students may enroll in a package of courses dealing with infectious diseases. Students interested in environmental epidemiology,

occupational epidemiology, and the epidemiology of cancer can also enroll in such a package.

A total of 2,137 students have attended the 16 prior sessions. Six hundred and eleven students came from medical schools, and 248 of these were from departments of preventive medicine. Departments of biochemistry, biostatistics, epidemiology, computer sciences, anatomy, biophysics, dermatology, environmental medicine, health education, medical genetics, internal medicine, pathology, pediatrics, physiology, psychiatry, radiotherapy, surgery, anesthesiology, geriatrics, and ophthalmology have also been represented. In addition, 549 students from schools of public health have enrolled in the sessions, as well as students from colleges of veterinary medicine, dentistry, nursing, pharmacy, and graduate schools. Federal and State agencies have been well represented, along with foreign government agencies and private industry.

Tuition for the 3-week session will be \$550. Special rates for food and lodging in dormitories have been arranged. Grants for tuition may become available, but prospective registrants should explore other sources of funding as soon as possible.

• The application deadline is May 1, 1982. A \$50 deposit, credited to tuition, should accompany applications, and will constitute evidence of intent to attend. Refund of the deposit will be made if the application is not accepted or if the applicant's plans change before May 1, 1982.

Further information and application

forms for the 1982 session may be obtained by writing to Dr. Leonard M. Schuman, Director, Graduate Summer Session in Epidemiology, University of Minnesota School of Public Health, 1-117 Health Sciences Unit A, 515 Delaware St., SE, Minneapolis, Minn. 55455.

Graduate programs in public health. The Department of Applied Health Sciences, Tulane University School of Public Health and Tropical Medicine, New Orleans, La., offers graduate programs of 36 and 45 hours leading to a master of public health degree in community health nursing (supervision or teaching and nursing administration); in health communication and education; and in maternal and child health services management; as well as a combined degree—master of social work and master of public health (maternal and child health).

Applications are now being considered for the 1982-83 academic year. For further information, write to Dr. John B. Vaughn, Chairman, Applied Health Sciences Department, Tulane University, School of Public Health and Tropical Medicine, 1430 Tulane Ave., New Orleans, La. 70112.

National symposium on nurse-managed centers. A national symposium will be held in Milwaukee, Wis., June 17-18, 1982, to define the problems, explore solutions, and ensure the future of nurse-managed centers or clinics. Participants are expected to come from faculties of schools of nursing and also from staffs of prospective nurse-managed centers or

clinics and of hospitals interested in establishing such centers.

A recent survey concerning nursing centers, which was sent to schools of nursing throughout the United States, indicated that there were 34 functioning nursing centers and that at least 37 others are planned.

Papers will be presented by O. Marie Henry, DNSc, RN, Chief, Nursing Practice Branch, Division of Nursing, Public Health Service, on "Definitions, Historical Perspective and Future Directions for Nurse Managed Centers;" by Norma Lang, PhD, RN, dean of School of Nursing, University of Wisconsin-Milwaukee, on "Research as a Basis for Practice: the Nursing Center's Potential;" and by JoEllen Hawkins, PhD, RN, University of Connecticut-Storrs, on "The Development, Implementation and Evaluation of a Nursing Center: the Step-by-Step Process."

Presentations on modules of nurse-managed centers will be made by Carol Klint, MS, RN, and Wealtha Alec, MS, RN, University of Illinois at Rockford; Ellamae Branstetter, PhD, RN, Arizona State University; Susan Riesch, DNSc, RN, University of Wisconsin-Milwaukee; Mary Lou Holle, MS, RN, and Jo Brooks, MPH, RN, Purdue University; Mary D. McEvoy, MS, RN, and Marie Vezina, MS, RN, Herbert H. Lehman College, New York; and Sally Lundeen, MS, RN, Erie (Pa.) Family Health Plan. Problem solving sessions are also scheduled.

For a brochure and more information, call 414: 963-7822, or write the Nursing Center, University of Wisconsin-Mil-

waukee, School of Nursing, P.O. Box 413, Milwaukee, Wis. 53201.

New PhD program in health services organization and research. A new doctoral program in health services organization and research will begin in the Department of Health Administration at the Medical College of Virginia, Virginia Commonwealth University, in the fall of 1982. The program will provide advanced training and education for academic and professional people who will teach, plan, evaluate, and investigate health care policies and medical care systems. It will emphasize the application of quantitative research methods and scientific knowledge from a variety of behavioral-social and management sciences to the solution of health care and health care management issues.

Health organization design and operations analysis-management sciences are major disciplines in the core knowledge area. Students select a concentration in one of the core disciplines with specialization in one research area: health manpower and productivity analysis, organizational systems design and analysis, health policy analysis, or long-term care research. In addition to the concentration, courses in research methods will be taken.

Financial assistance and assistantships are available from the university.

For further information contact Dr. Thomas T. H. Wan, Coordinator of PhD Program, Department of Health Administration, Medical College of Virginia, Virginia Commonwealth University, P. O. Box 203-MCV Station, Richmond, Va. 23298 or telephone 804: 786-9466.

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National Technical Information Service (NTIS), 5285 Port Royal Rd., Springfield, Va. 22161. Full payment must accompany orders, which should be identified by title and PB number.

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Radiological Health Training Resources Catalog 1981. DHHS Publication No. (FDA) 81-8023. Order No. PB 81-105412. \$8; \$3.50 microfiche. Single copies available from the Bureau of Radiological Health (HFX-28), 5600 Fishers Ln., Rockville, Md. 20857.

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A National Health Promotion Strategy

Earlier this year, Secretary Richard Schweiker took an important step reflecting the priority he assigns to disease prevention and health promotion by establishing an Executive Committee on Health Promotion to develop a comprehensive health promotion strategy for the Department of Health and Human Services (DHHS). In indication of his interest, the Secretary chairs the Committee with me as co-chairman. Other Executive Committee members include the heads of the major operating and staff divisions of the Department.

The primary emphasis of the DHHS health promotion strategy is to encourage behavioral and lifestyle changes that yield better health for Americans. While the initiative will embrace a broad range of efforts, the core concepts will be facilitating individual behavioral change to enhance the prospects for health. The component activities will include those that relate to lifestyle as well as those that pertain to the prevention of disease and disability through the appropriate use of preventive health services.

The choice of health promotion as the guiding theme for this important initiative highlights the changes that are occurring in our understanding of the importance of the various factors that influence health. This shift does not connote a di-

minution of traditional medical practice, but rather a recognition of our developing insight on the relationship between lifestyle and health status. Recent scientific advances and improvements in basic data systems have provided us with broader knowledge on the nature of certain diseases, as well as successful approaches for preventing them from occurring. People's daily decisions about smoking, diet, consumption of alcohol, and exercise can influence their own health destinies at least as much as the medical care that they may receive to treat their illnesses.

It is appropriate that the Department take advantage of this growth in knowledge and apply it to the development of a specific agenda to improve the health of the American people. The DHHS health promotion strategy is intended to mobilize the energies of individuals in all sectors and at all levels of society. The key element is the facilitation of behavior change through improved knowledge and understanding of the way in which each person can control his or her own health risks.

The Executive Committee is now in the process of developing the specific programs and activities that will frame this national health promotion effort. The programs and activities will focus on each age group and will include a range of behaviors which influence health status: dietary habits and eating patterns, physical exercise, smoking,

alcohol and drug abuse, and the appropriate use of preventive health services. The centerpiece of the initiative will consist of public and private information and educational programs offered through communities, the schools, the media, the worksite, and health care facilities.

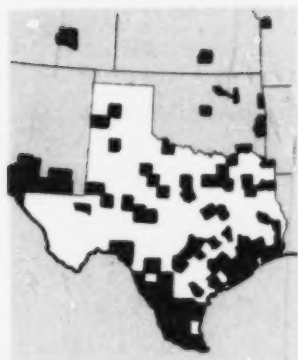
As I have stated in previous editorials, the Department cannot successfully achieve the goals set forth for this or any other major initiative acting alone. This must be a truly national effort. Change may not be immediate, and it will only occur with the support and full participation of every sector of society. The measures now being taken to strengthen the DHHS focus on health promotion should provide an important boost to the effort.

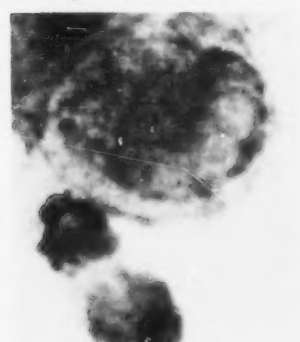
This initiative will demand the best efforts from all health professionals. It is a splendid opportunity for everyone committed to health promotion. Now is the time to get involved. Your participation is essential. If not you, then who?

Edward N. Brandt, Jr., MD, PhD
Assistant Secretary for Health

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Cover: The United States is close to the goal of measles eradication within its borders. Only 1,123 cases were reported in 1982 through the week ending August 7, compared with 441,703 cases in 1960. The prospects for the eradication of measles worldwide and the decrease in transmissions within this country are discussed in the paper on pages 402-405 of this issue. A poster used in the measles immunization campaign is reproduced on the inside back cover.

Prevention as Policy

EDWARD N. BRANDT, Jr., MD, PhD



THE RELATIONSHIP between epidemiology and health policy development has always existed and has always been recognized as crucial for the policymaker, although it may not be as prominent as some other relationships.

The noise level is so high these days concerning the costs of care and the fiscal restraints on Federal health programs—certainly important issues—that sometimes we may not hear some of the clear, substantive messages coming from the sta-

tistical or research communities. But those messages usually are quite significant for policymakers and for the general public. An important illustration of this is the shift toward prevention as a fundamental concept in national health policy. That shift was dictated to a great extent by the buildup of certain epidemiologic data. In addition, we must rely on a continuous flow of such data in order to know how effective our prevention policy really is: Where are we being successful? Where are we having no success? And where do we need additional resources?

Childhood Immunization

An excellent example of the relationship between epidemiologic data and the development of health policy is childhood immunization—one

of the great public health achievements in this country. Not only has immunization reduced the incidence of childhood diseases, but it has also reduced the chances of those diseases recurring and regenerating.

When the immunization program began in 1977, we had a "deficit" of some 25 million children who had not been reached. To overcome that deficit, the nation has set a number of specific goals of coverage to be achieved by the end of this decade:

- 90 percent of all children under the age of 2 with complete, basic series of vaccinations,
- 95 percent of all school-age children fully immunized,
- fewer than 1,000 reported cases a year each of mumps, rubella, and pertussis,

Dr. Brandt is Assistant Secretary for Health, Department of Health and Human Services. This paper is adapted from his address at the 55th annual meeting of the American Epidemiological Society in Kansas City, Mo., April 1, 1982.

Tearsheet requests to the Office of Public Affairs, Rm. 638 E, HHH Bldg., Washington, D.C. 20201.

- fewer than 500 reported cases a year of nonindigenous strains of measles,
- fewer than 50 reported cases a year each of diphtheria and tetanus, and
- fewer than 10 cases a year each of congenital rubella and poliomyelitis.

Thus far, we have made great strides toward reaching these important goals. With respect to measles, a total of only 3,032 cases were reported in 1981—a 77 percent decline from the total at the end of December 1980. Evidence now indicates that the number of reported cases of indigenous measles may be reduced to zero by the end of 1982.

In the course of this program, we found and immunized more than 20 million of the estimated 25 million children who had not yet been protected. Also, while the number of surviving newborns has risen slightly each year—currently about 3.6 million a year—we do not see a sharp increase in the national birth rate in the foreseeable future. I think we can keep pace with the demand for protecting new generations of children.

Of course, we could not have achieved this historic accomplishment for children without the commitment and professional dedication of thousands of public officials in State and local governments and many more thousands of concerned parents and educators working through various voluntary and professional associations at the national and local levels.

An estimated 50 million doses of vaccines are being administered to children each year. About half of these doses are given by public agencies—clinics or schools—and the other half are given by physicians or nurses in private practice. Although we are proud of this ac-

complishment, we cannot be complacent. We have made substantial progress, but the remaining 4 million or so youngsters who have not yet been reached are the most difficult to reach. They are "alive" in our statistical data bank, but that is almost all we know of them. If we knew precisely who they were, they would have been inoculated by now.

Another uncertainty is what the cost of vaccines will be in the coming year. Like everything else, they probably will go up, but we are not sure by how much. However, Secretary Schweiker, in addressing our commitment to maintain the momentum of the immunization program, stated that if at any time a lack of funds may jeopardize the effectiveness of the program he would not hesitate to go to the President and the Congress for additional money. And in fact the Secretary did so in May.

STDs

I have dwelt on the immunization program not only because it is important in itself, but also because it reveals the interplay among data collection, policy development, and budget planning. And we are about to replicate this whole sequence of events on another issue of growing, major significance for our society—the rise in the incidence of sexually transmitted diseases (STDs).

Hippocrates wrote, nearly 2,300 years ago, that "Changes are chiefly responsible for diseases, especially the great changes, the violent alterations both in seasons and in other things." We do not know just what "other things" he had in mind, but in our minds it is clear that "great changes" in America's social ethos in the past two decades are probably at the root of the current epidemic of sexually transmitted diseases.

The STD data coming in form a

truly alarming picture. Despite a leveling off of the incidence of gonorrhea, we still have a total annual caseload of 2.5 million. Added to this figure are 3 million cases of trichomoniasis, 2.5 million cases of nongonococcal urethritis, half a million new cases each year of genital herpes, some 80,000 cases of syphilis, and a rising caseload of hepatitis B, particularly among homosexual men. The STDs wreak extraordinary human havoc, causing sterility and pelvic inflammatory disease among women and visiting the newborn with pneumonia, birth defects, mental retardation, and death.

The policy implications are clear. We know that the availability of vaccines made the childhood immunization program possible. Therefore, we must support research aimed at producing effective vaccines, antibiotics, pharmaceuticals, and new diagnostic agents for STDs. We also need to focus on the more widespread diseases to reduce the total universe of victims to a manageable size. Finally, we need to set our goals for the next few years. Specifically, how are we going to address the problems surrounding each disease condition and its victims? What will be our program objectives? What is our time frame?

Need for Hard Data

In the publication, "Promoting Health, Preventing Disease: Objectives for the Nation," we sought to lay out such goals. These goals cover not only improved health status—reduction in the incidence and outcomes of various diseases—but also enhanced awareness by the public as well as professionals, improved surveillance and evaluation systems, and improved services and protection. Some 2,000 experts from across the broad spectrum of public health and social service profes-

sions helped to pull together the information and the goals pertinent not only to immunization and the STDs but also to 13 other areas of public health concern, including alcoholism, nutrition, maternal and child health, and drug abuse.

In the examples I have cited thus far, the epidemiologic data are reasonably plentiful. Since the process of collecting and analyzing those data is time tested, we can get on with drawing inferences and conclusions leading to the establishment of administrative and budget policies. And there are other examples of available data drawn from populations with a narrower base but with as much or greater depth. One such example is the landmark Framingham study which is yielding priceless longitudinal data on diseases of the cardiovascular system.

We are not so fortunate, however, with regard to information on the health status of certain large population groups and certain major diseases and disabling conditions within American society. For example, the United States now has the world's fifth largest Hispanic population, exceeded only by Mexico, Spain, Argentina, and Colombia. Yet, we have an inadequate body of data on the health status of our Hispanic citizens.

The Hispanic Health and Nutrition Examination Survey, conducted by the National Center for Health Statistics, should close much of that gap in the data. This survey is closely modeled on the now familiar national HANES survey. The pilot study was completed in El Paso, Tex., in mid-March 1982. A "dress rehearsal" was undertaken in mid-June, and the main survey began in July. By December 1984, we expect to have examined 12,000 Hispanic Americans between the ages of 6 months and 74 years. The results should give us, for the first time, the data base we need con-

cerning health status, access to care, health behaviors, and incidence and prevalence rates for various diseases and disabling conditions.

As a result of this survey, I see the health community as becoming much more effective in improving the health status of Hispanics. We will be able to provide better diagnostic and treatment services and more pertinent information for the development of preventive medicine strategies for Hispanic individuals and families.

As I mentioned before, we need more and better information not only about certain population groups but also about certain health problems. A project that responds to that need, the Epidemiologic Catchment Area Program, is now being conducted by the National Institute of Mental Health (NIMH). This project is our first attempt to gather the prevalence and incidence rates of mental health disorders as they are classified in the psychiatric manual and diagnosed and treated in clinical practice. This project should yield the framework—as well as the actual data—for clarifying the epidemiology of mental health, much as has been done with most aspects of physical health.

Although the Epidemiologic Catchment Area Program was started in 1978, it is only now beginning to produce hard data. By the time the first phase is completed in 1984, this project will have gathered information from some 17,500 people in 5 metropolitan areas—New Haven, Baltimore, St. Louis, Durham, and Los Angeles. While the project is concentrated on the epidemiology of mental health disorders across a broad spectrum of the population, the National Institutes of Health have augmented the survey to obtain a larger sample of elderly persons in those metropolitan areas. The aging, of course, are impor-

tant not only for today's planning for public health policy but for the decades ahead as well. However, at present we do not have the kinds of data that are essential for intelligent public health planning for this segment of the population, hence the importance of the current surveys.

The philosopher Rousseau said that "Hygiene is less a science than a virtue." And I suspect that in the public's mind the notion of prevention may also be more familiar as a homely virtue than as a sophisticated science. Most people know that an adequate diet, a good night's sleep, and a reasonable amount of daily exercise will contribute to their overall sense of well-being. But life is more complicated than that. People have to contend with contagious diseases, environmental insults, occupational risks, genetically transmitted conditions, and the overwhelming pressures of contemporary social life. They need a whole array of coping skills that draw less on virtuous good intentions and more on hard science.

Satisfying this need for hard data may be the major challenge to the discipline of epidemiology during the remaining years of this century. We cannot afford to coast much longer on the things we do know. We have a great need to gather, in quantity and in depth, the information that we still must know if we are to help people cope with threats to their mental and physical health.

The union of epidemiology with the concept of prevention is clearly a landmark example of how prevalence and incidence data may contribute to fundamental changes in Federal health policy. But the example is far from complete. It lacks the firm base of reliable, longitudinal data that can be acquired only with the interest and knowledge of professionals in the science of epidemiology.

The Global Elimination of Measles

WILLIAM H. FOEGE, MD



ERIC HOFFER, THE AMERICAN LABORER-PHILOSOPHER, once said, "Where there is the necessary technical skill to move mountains, there is no need for the faith that moves mountains." The technology for the global eradication of measles is at hand. What is needed is the social will to undertake such a breakthrough in international public health.

To assess the subject of global measles eradication, three questions must be answered: Can we eradicate measles? Should we eradicate measles? Will we eradicate measles?

The answer to the first question rests on scientific fact. We can eradicate measles. The smallpox eradication program proved that global eradication of certain infectious diseases is possible. Although there are obvious differences, there are also epidemiologic similarities between measles and smallpox. They are both viruses that cause recognizable rashes, a characteristic which helps epidemiologic surveillance programs. They both confer lifelong immunity. Neither has an animal reservoir or inapparent chronic carrier state among human beings.

Since 1963, an effective and safe vaccine for measles has been available, and it has been widely used in the United States and other countries. In the past it has not received maximum use because it required a smoothly functioning cold chain of storage, transporta-

tion, and delivery to preserve the viability of the vaccine virus. There is now a more heat-stable vaccine that can remain potent in the freeze-dried state for 3 to 4 weeks at ambient tropical temperatures without refrigeration. The containers which maintain cold temperatures and protect vaccines have also been improved. Coupled with this technological progress is an economic advantage—the cost of measles vaccine has declined to the current World Health Organization (WHO) price of only 10 cents per dose in 20-dose vials.

Measles can be controlled through widespread and logical use of this vaccine.

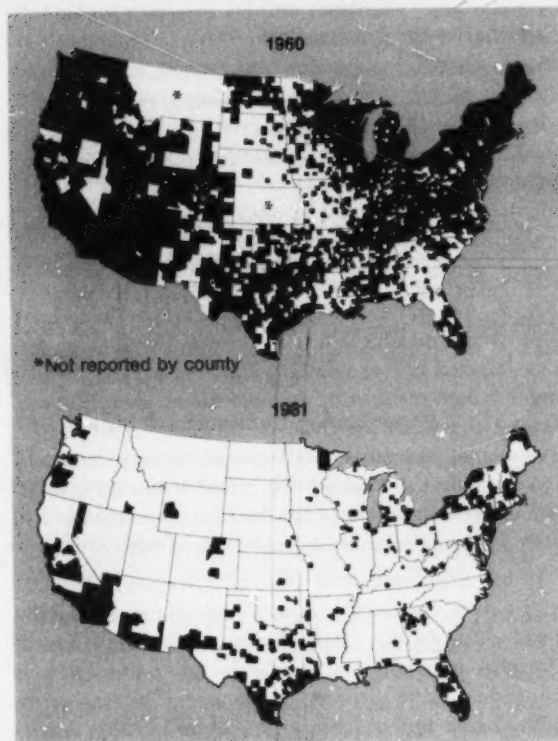
The West African Precedent

There is an historic precedent for interrupting chains of transmission of measles, a first step in the direction of eradication. In 1967, 20 countries of West Africa integrated their measles immunizations programs with a coordinated regional program for smallpox eradication. Mobile vaccination teams took vaccine to the villages of West Africa rather than obliging the populace to come to stationary health facilities. The original plan, which called for measles vaccine to be given to all children 6 months to 6 years of age with a repeat cycle every 3 years, had to be changed to fit the epidemiology of measles in West Africa, a pattern dissimilar to that in the United States.

Vaccine was administered to children 6 months to 36 months of age to allow for their earlier contact with the disease in Africa. Although the approach could protect many children, in order to interrupt measles

Dr. Foegen is director of the Centers for Disease Control, Public Health Service. Tearsheet requests to CDC Office of Public Affairs, Rm. 2067, Bldg. 1, Centers for Disease Control, Atlanta, Ga. 30333.

Incidence of reported cases of measles by county, United States
1960 and 1981



transmission in West African countries, computer studies indicated that vaccination cycles must be scheduled in villages as often as every 12 months.

To measure the outcome of the West African campaign after 1 year, combined results in 10 countries, representing 95 million people, were analyzed. The reduction in cases during the 12 months following immunization was conservatively calculated to be 54 percent. If that 54 percent reduction is an accurate figure, instead of a minimum as there is evidence to suggest, the reduction represents the prevention of 2.4 million cases of measles and approximately 170,000 deaths.

Results of the campaign in West Africa varied from country to country, because of the quality of immunization programs and the work of the public health teams. Perhaps the most dramatic results were in The Gambia. A small country of 350,000 people, The Gambia is almost totally surrounded by Senegal. The long international border encourages importation—a threat to measles elimination anywhere. In The Gambia, teams cycled every 12 to 18 months in the rural areas and every 6 to 12 months in the capital city. Surveillance was successful—officials investigated reported

cases and instituted control measures if the cases were measles.

The result of the attack phase of the campaign was the almost total freedom from disease in every geographic area of The Gambia for a period of more than 3 years. The sporadic cases occurring after 1967 were investigated and were related to importation of the virus from other countries.

The Gambia is an example of a country with limited resources that was able to remain measles-free despite a long international boundary and despite 14 importation challenges over 3 years. It was estimated that it cost approximately \$2.40 to prevent 1 case of measles in The Gambia and \$34 to prevent 1 measles death, assuming a mortality rate of 7 percent in that country.

Measles Incidence in the United States

Public health officials in the United States now place high priority on the elimination of indigenous measles transmission in the nation in 1982. Reported measles incidence rates reached record low levels in 1980 and 1981. For the 4-week reporting period ending June 12, 1982, only 172 cases of measles were reported to the Centers for Disease Control, approximately 43 cases per week on the average. This total is nearly 75 percent below the number of cases reported for the same period in 1981. Only 11 of the 3,144 counties in the United States reported measles cases during the week closing June 4, 1982. There have been dramatic differences in reported cases from individual States. Pennsylvania, which last year had a cumulative total of 404 cases by mid-June, in 1982 reported a total of 4 cases in the same period. Texas, with a cumulative total of 660 cases by mid-June 1981, reported 22 for the same period in 1982.

The best means of reducing the incidence of measles, in the United States as elsewhere, is to create an immune population. Nationally, the immunization level against measles for children entering school for the first time is now approximately 96 percent.

To reach the goal of interrupting transmission within U.S. borders by October 1982, universal immunization should be completed through routine and intensive programs carried out in physicians' offices and public health clinics. Programs designed to vaccinate children against measles at about 15 months of age should be established and maintained in all communities. Official health agencies should take whatever steps are necessary, including formulation and enforcement of school immunization requirements, to assure that all persons in schools and day care facilities are protected against measles. Enforcement of such requirements has been correlated with reduced measles incidence rates.

For example, following an outbreak of measles in Texas in 1961 with a high attack rate in persons 15-19 years old, school regulations for the State were revised so that effective September 1, 1981, a history of physician-verified measles or of adequate vaccination for measles is required for all students to attend school, including high school. In May 1981 it was estimated that approximately 290,000 students in public junior and senior high schools would need measles vaccination as a result of the rule changes. From August 1 through November 30, 1981, more than 112,600 doses of measles vaccine were administered through public health clinics to students 10-19 years old, an increase of 646 percent over the number of doses delivered during the same period in 1980. It is now estimated that 98.3 percent of the 2,919,150 students currently enrolled in the school districts in Texas are in compliance with the new State immunization requirements (1).

Rhode Island and Oregon were among the States experiencing imported cases of measles that threatened earlier successes. Rhode Island was the first State to attempt an End Measles Campaign in 1 day. The campaign was backed up by an intensive system of surveillance which had excellent results. In 1961, approximately 3,500 cases of measles were reported from Rhode Island. In 1966 only 80 cases were reported. For 4 years the Rhode Island model proved the feasibility of measles eradication. The spectre of imported cases appeared in 1969 when increasing numbers of cases occurred in two neighboring Portuguese-speaking communities. Many members of the communities had immigrated from the Azores or Cape Verde Islands.

The initial case in the outbreak was in a child who had visited Portugal and was infected there. Investigation of the outbreak, and later surveillance, proved that a high rate of protection against measles among non-Portuguese school children of the community served as a barrier to the spread of the disease among all children. The outbreak highlighted a new group of susceptibles to measles not previously recognized—immigrants from under-vaccinated areas.

Some 3 years earlier in Washington County, Oreg., health officials reacted to a localized measles outbreak that may have been related to importation by migrant workers entering that State in 1966. Surveys of physicians, school teachers, and school children confirmed the existence of a measles epidemic in Hillsboro, Washington County. Mass immunization programs for children in kindergarten through third grade were held in county schools—2,766 doses were given to children of the county in regular clinics. The outbreak was controlled within Hillsboro and did not spread outside Washington County. These early examples of con-

trolling importation-caused epidemics have been repeated many times in recent years.

Arguments for Eradication

The scientific evidence that measles can be eliminated seems to be solid. The second question to be asked is, "Should we eradicate measles?" In an era of scarce global resources, should money and talent be spent on eradication?

Again, the answer is yes—we should eradicate measles for reasons pertaining to both health and economics. Measles is a major source of unnecessary suffering, premature mortality, and expense. Except in isolated populations, measles is nearly universal, with most persons infected before reaching age 15. Measles, under any circumstances, can cause serious complications. Among these are diarrhea, encephalitis, otitis media, pneumonia, exacerbation of protein energy malnutrition, and death. Therapy for measles and its complications is a major drain on medical care resources in most parts of Africa, Asia, and Latin America (2).

It has been estimated that approximately 900,000 deaths from measles occur each year in the developing world (2). In the Inter-American Investigation of Mortality in Childhood it was found that measles is the leading cause of death or the second leading cause in children 1 to 4 years in several cities in Latin America (3). Measles outbreaks in Africa and Asia have case fatality rates of 5 to 20 percent among children, especially the malnourished ones.

Measles complications may also result in developmental retardation, lifelong handicaps, and economic loss in both direct and indirect costs. Furthermore, in children in the developing world, measles interacts with diarrheal disease and malnutrition to increase the morbidity and mortality from these conditions. In the developed nations, where the disease is less severe and there are facilities to save lives, it is still important to eliminate measles.

Following the cessation of indigenous transmissions of measles, the United States must continue to bear the costs of routine vaccination, surveillance, and response to imported cases until global eradication is achieved. It has been estimated that these costs, for both treatment and prevention, may exceed \$50 million a year. The earlier the global target of eradication is achieved, the sooner the United States can discontinue these expenditures. The nation bore the considerable cost of keeping the population free of smallpox for more than 25 years before the global Smallpox Eradication Program began. The \$32 million, which the United States invested in the Smallpox Eradication

Program over 12 years, is saved every 3 months because the global progress against smallpox allowed the United States to discontinue routine vaccination and other activities related to protection against smallpox (4). The prevention of measles by vaccination was estimated to yield an annual net savings of \$130 million for the period 1963-72 in the United States. Current annual savings are estimated to be approximately \$500 million. Measles vaccination in the United States is estimated to have a benefit-cost ratio of 10 to 1. The return on such an investment in the developing world, where morbidity and mortality for measles are higher, would be even greater. A preliminary analysis of vaccine programs in the Ivory Coast suggests the benefit to cost ratio may well exceed 20 to 1.

Will Global Eradication Be Achieved?

The final question to be asked about the global eradication of measles is the most difficult—will we do it? Will we muster the social will to eliminate another disease from world experience? A realistic answer is that, probably, it will not be done for a long time.

Perceptions of measles as a problem differ. However, its eradication is a goal worthy of accomplishment. A mechanism for achieving this goal already is being developed: the global Expanded Program of Immunization (EPI) coordinated by the World Health Organization. The EPI is successfully working with national governments and international donor agencies toward insuring that immunization against five diseases is routinely available to all children in the world by 1990.

Establishment of eradication as a goal might also help to stimulate increased action in many developed countries whose populations have immunization levels high enough to reduce measles incidence to a point where the disease persists but is no longer a highly visible problem. In England, for example, an average of 125,000 cases each year were reported in the period 1971 through 1980, and 24 deaths per year in the period 1971 through 1977. Although these totals represent a 70 percent decline in cases and deaths compared to the immediate prevaccine era, a concerted public health effort could further reduce unnecessary death and disability from measles in England. A realistic answer to the question "will we eradicate measles?" must also consider serious differences between smallpox and measles. Measles is a highly contagious disease, capable of causing explosive outbreaks and spreading rapidly. This characteristic contrasts with the epidemiology of smallpox, which generally spreads more slowly and could be contained by aggressive outbreak control measures. This

difference in the two diseases suggests that an essential ingredient of any measles eradication program would be to attain and maintain extremely high immunization levels, probably in excess of 90 percent. Smallpox was eradicated by containment of outbreaks and cases in many areas, but the immunity rates of the general population were often less than 50 percent. Measles immunization will have to reach children in virtually all parts of a country simultaneously and successfully.

Another important difference between smallpox and measles concerns the age of infection. Smallpox frequently involves children of all ages and adults. Measles infection typically occurs in the developing world at approximately 12 to 18 months of age. Measles vaccine cannot be given effectively before the sixth or ninth month of life, and maximum serum conversion may not occur in some populations until 12 to 15 months. This restriction would suggest that a permanent primary-care infrastructure capable of routinely delivering vaccines to the majority of the population is necessary to eliminate measles transmission.

A final major difference will be the increased difficulty of surveillance operations for measles compared with smallpox. Measles is more readily confused with other rash illnesses, and it does not leave a visible, easily recognized trail such as the scars that helped to determine who was immune to smallpox. Occasional serologic surveys will be required unless reliable records are available. These requirements pose additional logistic and laboratory costs for a measles eradication program.

Worldwide measles eradication is worthy of our best endeavors. The international public health community should strive for it, but the leaders should not hold out false promises of rapid accomplishment. This achievement will be another major test of will, and failure will be measured by each case of measles that occurs. No measles case is inevitable. Each one is a failure of the public health establishment to convince society that eradication is a goal deserving of the necessary resources and support to become reality.

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Pneumococcal Vaccination Practices Among Private Physicians

PETER A. PATRIARCA, MD
WALTER F. SCHLECH, III, MD
ALAN R. HINMAN, MD
JUDITH M. CONN, MS
WALTER J. GUNN, PhD



IN NOVEMBER 1977, the Food and Drug Administration licensed a 14-valent pneumococcal polysaccharide vaccine (PPV) for administration to persons over 2 years old who are considered to be at high risk for invasive pneumococcal disease. The high-risk categories include people with chronic cardiac, pulmonary, hepatic, renal, metabolic, or immune system conditions, and the elderly (1-3). The number of people in the United States in these categories was estimated at more than 48 million in the 1979 Immunization Survey by the Centers for Disease Control.

Since the time of licensure, PPV has not gained wide acceptance in the medical community. Only about 4 million doses had been administered as of January 1981, almost exclusively by private practitioners. To further define the attitudes and immunization practices of private physicians and to determine whether some

high-risk groups are more likely than others to be immunized with PPV, a nationwide survey of private, primary-care physicians was conducted.

Methods

A random sample of general and family practitioners, internists, and pediatricians was drawn from the American Medical Association's directory of all physicians practicing in the United States. Questionnaires were administered, primarily by telephone during August and September 1980, to 1,002 of 2,100 physicians (47 percent) in the original sample. A minimum of four attempts were made to contact each physician. Of 893 respondents included in the study, 299 were general and family practitioners, 289 were internists, and 305 were pediatricians. When responses to a given question were aggregated and presented as a single total, the data were weighted to bring each of the three specialty samples into proper proportion with the total population of primary-care physicians practicing in the United States. Weight coefficients were derived by treating each sample as a fraction of the specialty group from which it was drawn.

To assess the validity of the sample, data from respondents were compared with data from all other

All the authors are with the Centers for Disease Control: Dr. Patriarca and Dr. Hinman, Immunization Division, Center for Prevention Services; Dr. Schlech, Bacterial Diseases Division, Center for Infectious Diseases; and Ms. Conn and Dr. Gunn, Center for Health Promotion and Education. Tearsheet requests to Peter A. Patriarca, MD, Viral Diseases Division, Center for Infectious Diseases, Centers for Disease Control, Atlanta, Ga. 30333.

Table 1. Number and percentage of respondents who usually administer pneumococcal vaccine (APV) and who think pneumococcal vaccine is indicated (PVI), by patient category

Patient category	General and family practitioners				Internists				Pediatricians			
	APV		PVI		APV		PVI		APV		PVI	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Age 65 or older	141	47	194	65	136	47	156	54	...	...	137	45
Age 50-64	66	22	81	27	52	18	40	14	...	...	24	8
Age 2 or older with:												
Splenic dysfunction	132	44	1221	74	145	50	1217	75	171	56	1284	93
Anatomic asplenia	129	43	1221	74	145	50	1220	76	165	54	1287	94
Diabetes mellitus	135	45	1197	66	142	49	1162	56	76	25	1116	38
Cardiorespiratory disease ..	182	61	1242	81	188	65	1225	78	101	33	1174	57
Liver disease	120	40	1170	57	113	39	1142	49	46	15	198	32
Renal impairment	126	42	1185	62	133	46	1153	53	76	25	1140	46
Conditions requiring institutionalization	129	43	1194	65	124	43	1156	54	18	6	195	26
Chronic neurological impairment	120	40	1164	55	113	39	1150	52	49	16	185	28
Retardation	78	26	1114	38	72	25	84	29	21	7	40	13
Pregnancy	9	3	15	5	6	2	12	4	3	1	9	3

¹ Statistically significant difference between APV and PVI ($P < 0.05$, chi-square test).

U.S. physicians in those specialties (4). Chi-square analysis was used to test significance.

Results

Sample validity. General and family practice respondents were more likely to have urban practices ($P < 0.01$) and more likely to be located in the north-central region of the country rather than the West ($P < 0.05$) than all other general and family practitioners. No significant differences were observed for the internists and pediatricians.

Patient populations. Of the internists' patients, 56 percent were ≥ 50 years old and 31 percent were ≥ 65 years old. Patients of general and family practitioners were equally distributed in all age groups. An estimated 63 percent of the patients ≥ 65 years and 26 percent of those < 65 years had chronic diseases for

which PPV administration had been suggested. Only 7 percent of the pediatricians' patients reportedly had such diseases.

Physicians' attitudes and practices regarding PPV administration. Of all the respondents, 72 percent (75 percent of the general and family practitioners, 79 percent of the internists, and 62 percent of the pediatricians) usually administer PPV to at least some of their patients. When asked which patients should receive the vaccine, the respondents most commonly indicated persons with cardiorespiratory diseases and those with asplenia (table 1). However, the proportion of respondents who usually immunize patients within these and other categories was often significantly lower (table 1). Information regarding PPV, including indications for its use, was obtained from a variety of sources, but most often from the medical literature (table 2).

Of the 28 percent of the respondents who did not administer PPV, 45 percent thought it was unnecessary, and another 21 percent expressed lack of familiarity with the vaccine. Patient refusal, reservations about safety, and lack of consensus for the indications of PPV were cited infrequently (8 percent, 7 percent, and 1 percent of the respondents, respectively).

Discussion

In view of the relatively low completion rate, and significant differences in location between general and family practice respondents and all other general and

Table 2. Sources of information cited by 641 physicians who administer pneumococcal vaccine

Source	Physicians	
	Number	Percent
Personal review of medical literature	423	66
Advice of manufacturer	333	52
Public Health Service guidelines	224	35
Local and State health department guidelines ..	186	29
Past experience	103	16
Don't know or no response	13	2

family practice physicians, this survey may not be entirely representative of private, primary-care physicians who practice in the United States. Nevertheless, the results suggest that these physicians fail to pursue an active PPV program for patients in all high-risk categories, even though they generally agree with current published guidelines (1-3). This observation is consistent with a study of PPV use in a single locality, as well as with studies of the use of other vaccines (5-7).

The observed discrepancy between attitudes and practices in this survey could not be explained by any single factor. Many respondents had reviewed the medical literature to learn more about PPV, and they may have been influenced by reports of vaccine failures (8-10) and potentially low (11) or inadequately studied efficacy among high-risk groups (12). However, respondents vaccinated patients with cardiorespiratory diseases more often than patients in other categories, despite a lack of sufficient data on efficacy of the vaccine to support this practice (13). Physician apathy and poor public awareness, factors proposed by others (14,15), may also help to explain the discrepancy. But, the safety of PPV and patient refusal—reservations expressed by only 18 respondents—do not appear to be important. The relatively low rate of PPV administration to some high-risk groups (for example, patients with asplenia) may reflect small numbers of such patients in the practices of some respondents, particularly pediatricians.

Although at least several factors may contribute to the consistent underuse of PPV, the individual importance of each factor remains unknown. When recommendations become more clearly defined for each high-risk group, careful assessment of these factors as well as dissemination of accurate information to both physicians and the public will become increasingly important.

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SYNOPSIS

PATRIARCA, PETER (Centers for Disease Control), SCHLECH, WALTER F., III, HINMAN, ALAN R., CONN, JUDITH M., and GUNN, WALTER J.: *Pneumococcal vaccination practices among private physicians. Public Health Reports*, Vol. 97, September-October 1982, pp. 406-408.

It is estimated that less than 10

percent of patients thought to be at high risk of invasive pneumococcal diseases have received 14-valent pneumococcal polysaccharide vaccine. To determine if any of these groups are more likely to be vaccinated than others, 893 private, primary-care physicians were surveyed nationwide. Although there was gen-

eral agreement that the vaccine is indicated for the high-risk groups, patients with cardiorespiratory diseases were the only ones usually immunized by more than half of the survey respondents. The discrepancy between attitudes and practices could not be attributed to any specific factor.

Sexually Transmitted Diseases: Meeting the 1990 Objectives—a Challenge for the 1980s

PAUL J. WIESNER, MD
WILLIAM C. PARRA, MS



THE FIRST SURGEON GENERAL'S REPORT ON Health Promotion and Disease Prevention, *Healthy People*, chronicled a century of dramatic gains in the health of the American people, previewed current preventable threats to health, and identified 15 health priority areas in which further actions are required to improve the health of our people. Importantly, the report established broad national goals, expressed as reductions in overall death rates or days of disability, for the improvement of the health of Americans at the five major life stages. To achieve these broad goals, specific and measurable national prevention objectives were systematically established for each of the 15 priority areas and delineated in the document "Promoting Health/Preventing Disease: Objectives for the Nation."

Sexually transmitted diseases (STDs) is 1 of the 15 health priority areas addressed in the report. These diseases represent a major health problem in this country, cause patients enormous suffering, and cost the nation billions of dollars annually. Important areas of concern include continuing epidemics of gonococcal and chlamydial infections, the rising incidence of infectious syphilis, and the increasing numbers of genital herpes infections. Moreover, we have an improved understanding of the long-term effect that these infections have on reproductive health and pregnancy outcome. Thus, the STD field has grown in scope and complexity during the past decade (table 1). Demographic, sociological, and behavioral changes in our society are certainly important contributors to today's problem:

1. The baby boom of the 1950s and 1960s has led to the young adult boom of the 1970s and 1980s. By

the mid-1980s, the population between the ages of 18 and 29 will peak at approximately 49 million (1).

2. An increasing proportion of women in the 15-19 age group is engaging in sexual intercourse before marriage (2,3).

3. The proportion of sexually experienced, never-married women who had more than 1 sex partner increased from 38.5 percent in 1971 to 49.9 percent in 1976 (4).

4. The divorce rate has steadily increased from 2.6 per 1,000 total population in 1967 to 5.3 per 1,000 in 1980 (5).

5. More adults are remaining single or postponing marriage. The rate of widowed and divorced women remaining single increased from 52.9 percent in 1965 to 67.7 percent in 1977 (6).

These social changes indicate that increasing numbers of teenagers and single adults are initiating sexual activity at an earlier age, are having multiple sex partners, and are remaining single for a longer time. These changes in sexual behavior patterns are placing more people at a higher risk of STDs than ever before, thus further aggravating the STD control problem and posing a major challenge to public and private medicine.

Expanding Spectrum of Disease

Today, 10 million cases of STD occur in our young adult population. Conservative estimates of the total costs of STD to our society exceed \$2 billion annually, with the cost of gonorrhea alone exceeding \$1.1 billion (7). In particular, women and newborns bear an inordinate share of the physical and emotional complications. The effects on the neonate are among the more devastating aspects of the problem:

Dr. Wiesner is Director of the Venereal Disease Control Division and Mr. Parra is Chief of the Training, Education, and Consultation Section in that Division, Centers for Disease Control, Atlanta, Ga. 30333. Tearsheet requests to Dr. Wiesner.

1. One out of every 20 offspring born in this country will have a chlamydial infection; of the infected group, 1 out of every 2 will develop conjunctivitis, and 1 out of every 5 will develop pneumonia (8).

2. Early syphilis is increasing among women of child-bearing age. If early syphilis is untreated during pregnancy, 40 percent of the infants will be stillborn, born prematurely, or suffer neonatal death. Another 40 percent will have congenital syphilis. Thus, a woman who has early, untreated syphilis during her pregnancy has only a 1 in 5 chance of delivering a normal infant (9).

3. As many as 3 out of every 10,000 newborns may be infected by type II herpes simplex virus. Half of these may eventually die in the neonatal period, while 25 percent of those surviving will suffer serious neurological defects (8).

4. Congenital infections caused by cytomegalovirus (CMV) are estimated to occur in 1.5 percent of all pregnancies, affecting 45,000 newborns annually. Fifteen percent of these infants will be retarded, deaf,

or suffer visual defects. Sexual transmission is suspected in a significant portion of primary cytomegalovirus infections, although the exact percentage is not known (8).

5. Group B streptococcus infections are estimated to cause symptomatic disease annually in 12,000 infants under 3 months of age. Nearly 5,000 infant deaths a year are attributable to this infection. An unknown portion of these cases are probably transmitted sexually during pregnancy (10).

6. Pelvic inflammatory disease (PID) is the most common serious complication of gonococcal and chlamydial infections. An estimated 1 million episodes occur annually, leading to 25,000 ectopic pregnancies, 213,000 hospitalizations, 115,000 major pelvic surgeries often resulting in permanent sterility, and 900 deaths (11).

Gonorrhea Control

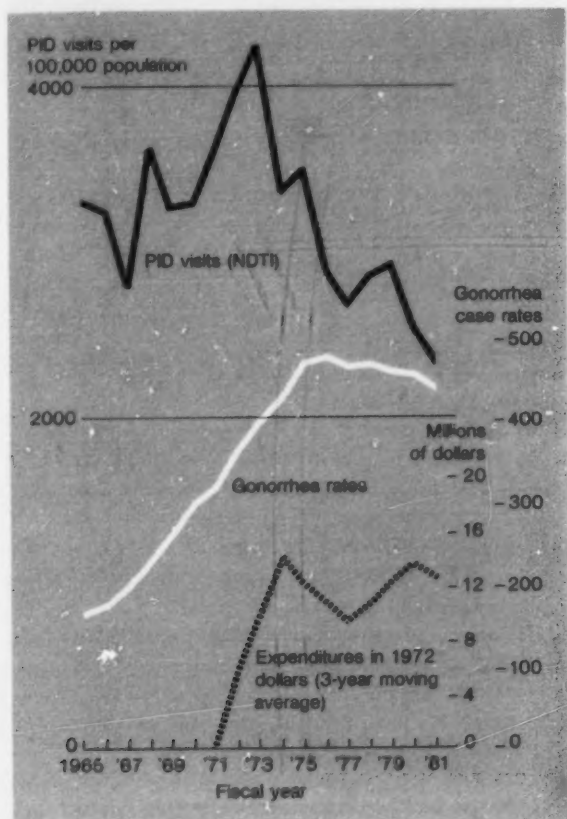
A major accomplishment of the cooperative effort between public and private health programs is the re-

Table 1. Major syndromes of sexually transmitted diseases

Syndrome and complication	Sexually transmitted etiological agent
Salpingitis	<i>Neisseria gonorrhoeae</i> , <i>Chlamydia trachomatis</i> , <i>Mycoplasma hominis</i>
Infertility:	
Tubal damage following acute salpingitis	<i>N. gonorrhoeae</i> , <i>C. trachomatis</i> , <i>M. hominis</i>
Postepididymitis	<i>N. gonorrhoeae</i> , <i>C. trachomatis</i>
Ectopic pregnancy, postsalpingitis	<i>N. gonorrhoeae</i> , <i>C. trachomatis</i> , <i>M. hominis</i>
Pregnancy morbidity, including spontaneous abortion, stillbirth, premature labor/low birth weight, premature rupture of membranes, chorioamnionitis, and postpartum endometritis	<i>Herpes simplex virus</i> , <i>Treponema pallidum</i> , <i>C. trachomatis</i> , <i>N. gonorrhoeae</i> , <i>Ureaplasma urealyticum</i>
Congenital and perinatal infections:	
"TORCHES" syndrome ¹	Cytomegalovirus, herpes simplex virus, <i>T. pallidum</i>
Other infant and childhood morbidity, including—	
Sepsis	<i>N. gonorrhoeae</i> Group B <i>Streptococcus</i> ?
Eye infection	<i>C. trachomatis</i> , <i>N. gonorrhoeae</i>
Pneumonia	<i>C. trachomatis</i> , <i>T. pallidum</i>
Otitis media	<i>C. trachomatis</i>
Cognitive impairment	Cytomegalovirus, herpes simplex virus, <i>T. pallidum</i> , Group B <i>Streptococcus</i> ?
Male urethritis	<i>N. gonorrhoeae</i> , <i>C. trachomatis</i> , <i>U. urealyticum</i>
Epididymitis	<i>N. gonorrhoeae</i> , <i>C. trachomatis</i>
Lower genital tract infection in women:	
Vulvitis	<i>Candida albicans</i> , herpes simplex virus
Vaginitis	<i>Trichomonas vaginalis</i> , <i>C. albicans</i> , <i>Gardnerella vaginalis</i>
Cervicitis	<i>N. gonorrhoeae</i> , <i>C. trachomatis</i> , herpes simplex virus
Female urethritis	<i>N. gonorrhoeae</i> , <i>C. trachomatis</i>
Genital ulceration	<i>Herpes simplex virus</i> , <i>T. pallidum</i> , <i>Haemophilus ducreyi</i> , <i>Caryobacterium granulomatis</i> , <i>C. trachomatis</i> (lymphogranuloma venereum)
Proctitis	<i>N. gonorrhoeae</i> , herpes simplex virus, <i>C. trachomatis</i> , <i>Campylobacter fetus</i> , <i>Shigella</i> spp., <i>Entamoeba histolytica</i>
Acute arthritis with genital infection	<i>N. gonorrhoeae</i> , <i>C. trachomatis</i>
Hepatitis	Hepatitis B virus, hepatitis A virus, cytomegalovirus, <i>T. pallidum</i>

¹ "TORCHES" syndrome refers to congenital infections caused by toxoplasmosis, rubella, cytomegalovirus, herpes simplex virus, and syphilis.

Figure 1. Gonorrhea case rates and visits for pelvic inflammatory disease (PID) per 100,000 population versus Federal project grants to States, in 1972 dollars,¹ United States, fiscal years 1965-1981



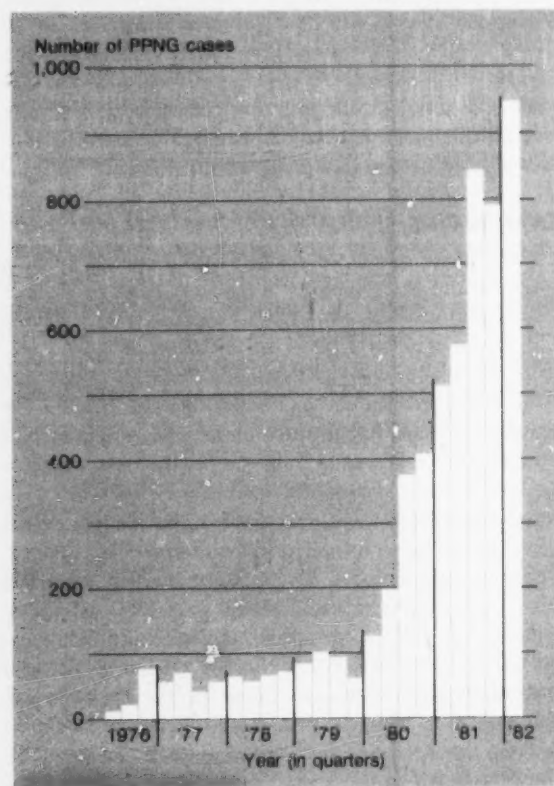
¹ Adjustment for 1972 dollars by price deflators for Federal Government purchases of goods and services.

NOTE: NDTI is National Disease Therapeutic Index, IMS America Ltd.

versal in the gonorrhea morbidity rate, which had increased annually at approximately 12 percent between 1965 and 1975 (12). With the implementation, in 1972, of a national program to control gonorrhea, peak Federal expenditures in 1974 were followed by decreased gonorrhea morbidity in 1975 (fig. 1). The number of visits by PID patients to private physicians' offices between 1973 and 1981 also decreased by a dramatic 45 percent (unpublished data from IMS America Ltd., National Disease Therapeutic Index). More importantly, actual decreases occurred despite the social changes just described that place increasing numbers of people at risk for STDs.

The outlook for control of penicillinase-producing *Neisseria gonorrhoeae* (PPNG) infections, however, is not as encouraging. PPNG was first isolated in the United States in early 1976 (13). The State and local health departments, assisted by the Centers for Disease Control (CDC), began prospective surveillance for

Figure 2. Number of cases of penicillinase-producing *Neisseria gonorrhoeae* (PPNG), by quarter, United States (including outlying areas), April 1976-March 1982



PPNG strains by the latter part of the year. Over the next several years, the reported incidence remained relatively stable. The majority of cases were linked to infections acquired overseas and, through active epidemiologic intervention, sustained civilian-to-civilian transmission appeared to be rare. Although PPNG infections still account for only a small proportion of the gonococcal infections reported in this country, reported PPNG cases have increased dramatically—from 328 in 1979 to 1,118 cases in 1980, a 241 percent increase! In 1981, 2,747 cases were reported, an increase of 146 percent over the number reported in 1980 (fig. 2).

The reasons for the increase in PPNG infections over the past 2 years are not entirely clear. To a large extent, the additional number of infections is a consequence of continuing importation of PPNG strains into this country (13,14). However, part of the increase may reflect changes in laboratory surveillance procedures. No indications exist as yet that PPNG infections have spread to any level beyond the capabilities of STD control programs in this country. In fact, recent experiences in Los Angeles, where an intensive

control effort was undertaken, support the contention that even large metropolitan areas can transform the PPNG problem from one of sustained domestic transmission to one of only newly imported cases occurring (15). Nonetheless, recognizing the extreme stress the current STD epidemic is placing on both public health and private medicine, we are concerned about the possibility that PPNG infections may surpass the capabilities of STD control programs to prevent them.

Syphilis Control

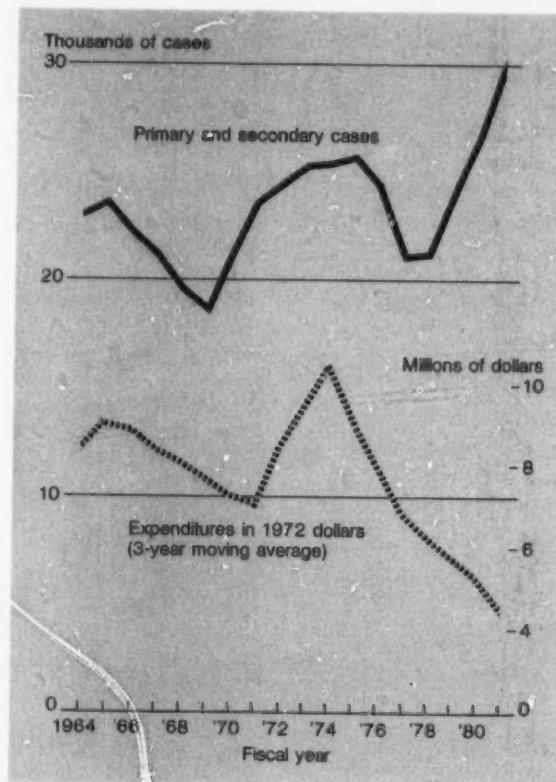
Since Federal assistance and efforts to control syphilis began in the early 1940s, the reported cases of syphilis (all stages) have decreased by 87 percent. Infant deaths directly related to syphilis have declined by 99 percent, and first admissions to mental hospitals of patients with diagnosed syphilis psychoses have declined by 98 percent (16). Although these data indicate a potential success story, current syphilis trends warrant concern. In recent years, the number of reported cases of early infectious syphilis has increased markedly. In fiscal year 1981, the number of primary and secondary cases reported represented a 43.4 percent increase over the number of cases reported in fiscal year 1980 (12). For women, cases of early syphilis increased by 21.6 percent from 1980 to 1981 (12). Reported cases of congenital syphilis in infants under 1 year old reflected this change as well—in fiscal year 1981, there was a 20 percent increase over those reported in fiscal year 1979, the year in which the lowest level of congenital syphilis cases was reported in the history of this country (12). The increase during calendar years was even more dramatic—in 1981, a 54 percent increase occurred in cases of congenital syphilis in infants under 1 year old, compared to those reported in calendar year 1978 (12).

We are clearly falling behind in syphilis control. Syphilis trends appear to be affected by the level of Federal grant support directed against this infection. Increased funding has been followed by a decline in reported cases; upward trends in syphilis morbidity have followed periods of decreasing Federal grant support (fig. 3). The recent increase in reported morbidity is believed to reflect an actual increase in the incidence of the disease. Programmatically, we ascribe this increase primarily to a shift of limited resources from syphilis to gonorrhea control.

Cost Benefit of Prevention

Despite concerns about syphilis trends, dollars spent on preventing STDs pay large dividends. In fiscal year 1981, federally supported syphilis and gonorrhea control efforts—based on prevention of an estimated 209,400 new cases—saved approximately \$150 million (unpub-

Figure 3. Inflation and Federal project grants to States for syphilis control, primary and secondary cases of syphilis versus Federal project grants to States, in 1972 dollars,¹ fiscal years 1964-81



¹ Adjustments for 1972 dollars by price deflators for Federal Government purchases of goods and services.

lished projections, Centers for Disease Control), as follows:

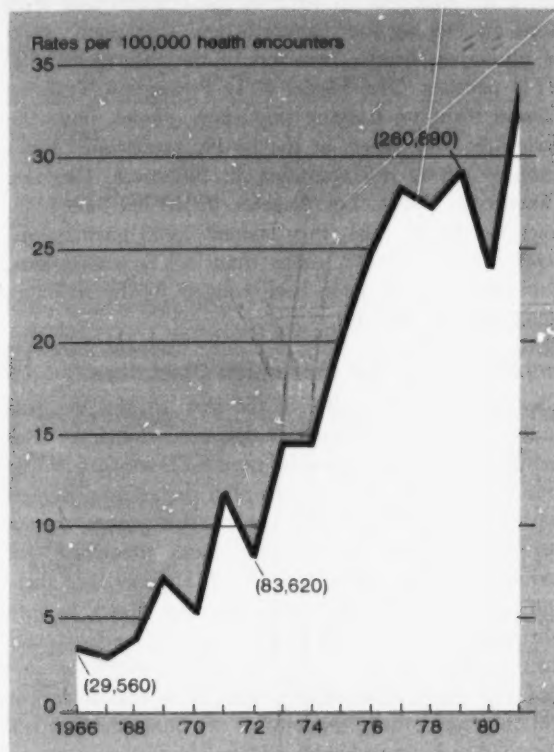
- \$119.3 million from prevented complications of gonorrhea and syphilis (gonococcal PID, fetal deaths, and congenital and late syphilis),
- \$24.3 million from prevented uncomplicated cases of gonorrhea, and
- \$5.8 million from treatment costs by preventing the broad establishment of PPNG (currently only 0.4 percent of all gonorrhea costs).

Of the total savings from control program activities, 85 percent or \$135 million were attributed to prevention efforts supported by Federal funds. For every Federal dollar spent in fiscal year 1981 (\$47.2 million in grant support and direct operation), \$3 were saved in diseases prevented.

The Challenge of Other STDs

Infections caused by *Chlamydia trachomatis* are now among the most prevalent STDs in our country. An

Figure 4. Estimated rates of patient encounters with private physicians for genital herpes infection, United States, 1966-79



NOTE: Figures in parentheses are exact amounts.
DATA SOURCE: National Disease Therapeutic Index, IMS America Ltd.

estimated 2.5 million cases of nongonococcal urethritis and related chlamydial infections occur in the United States each year (7). In a large inner-city hospital in Atlanta, *C. trachomatis* was detected in 15 percent of pregnant women (17). The clinical spectrum for the disease is almost identical to that of gonorrhea. Both infections cause urethritis and epididymitis in men and cervicitis and salpingitis in women. They also pose a sizable risk of transmission to newborns and contribute to poor pregnancy outcome.

Genital herpetic infections appear to be on the rise as well. The estimated rates of patient encounters with

private physicians for genital herpes infections rose dramatically between 1966 and 1981 (fig. 4). Neonatal mortality, based on data recorded on death certificates, has increased from 2.3 per million live births in 1968 to 9.0 per million live births in 1978 (National Center for Health Statistics, unpublished mortality data). What proportion of these increases is due to a greater professional awareness of herpes infection is unknown.

Although chlamydia and genital herpes are common and cause serious problems, control efforts are as yet unproved. Diagnosis of chlamydia is expensive and therefore not widely available for use in any generalized screening effort to identify asymptomatic women. Diagnostic capabilities are somewhat more available for herpetic lesions, although treatment is virtually nonexistent (except for some amelioration of initial infections). More important, preventive approaches beyond patient education are questionable (table 2).

Role of the Federal Government

Several agencies in the Public Health Service are engaged in the Federal effort against the STDs. CDC, as the lead agency, is involved with public education, professional training, surveillance, evaluation, and operational research. CDC assists in the national control of STDs through components of the Health Services Administration (HSA) at national, State, and local levels to (a) prepare service guidelines and standards, (b) provide STD training to medical and paramedical staffs, and (c) assure consistency in service including patient education, diagnosis, treatment, and epidemiologic followup for STDs in all HSA health care facilities. CDC coordinates its venereal disease research activities with various components of the National Institutes of Health and collaborates with the Food and Drug Administration in moving promising STD therapies through approval stages and in developing package inserts for licensed diagnostic and treatment products.

CDC currently provides Federal grant support to 63 project areas. These funds assist State and local areas in implementing control programs such as (a) patient interviewing and counseling for the timely referral of

Table 2. Prevention priority¹ for sexually transmitted diseases

Disease	Numbers of cases	Consequences per case	Specific diagnosis	Treatment	Prevention methods
Gonorrhea	High	Moderate	Inexpensive, available	Excellent	Proved
Syphilis	Moderate	Moderate	Inexpensive, available	Excellent	Proved
Chlamydia	High	Moderate	² Expensive, limited	Very good	Theoretical
Herpes	High	Moderate	² Expensive, limited	Very limited	Questionable

¹ With existing technology.

² Clinical diagnosis is useful, however.

sexual partners, (b) intensive screening of women at high risk of gonococcal infections, (c) following reactive serologic tests to identify patients in need of diagnosis and treatment for syphilis, (d) patient education programs, including high-risk persons and general public education-school education programs, (e) intensive hospital surveillance systems for the identification and care of women with gonococcal PID, and (f) clinical training programs to refine diagnostic and treatment skills.

Consumer and professional education in STD control have been more heavily emphasized in recent years. In consumer education, CDC is preparing prototype school curriculum materials to facilitate the introduction of STD education into curriculums throughout the country. The self-instructional materials, for students in grades 6 through 12, are accomplished by a teacher's guide with supplementary learning activities. Field testing of the materials will be completed in 1982. In 1983, a commercial publisher will publish, market, and distribute them nationally.

A second national consumer education project, the VD National Hotline, was implemented to provide both general and referral information to people at high risk of STDs. The toll-free Hotline, operated by the American Social Health Association (ASHA) in Palo Alto, Calif., is partially supported by a Federal grant. It has four incoming WATS lines, three national and one State (California). Direct answers are given to questions about STDs from 8 am to 8 pm weekdays (Pacific standard time) and 10 am to 6 pm on weekends. More than 107,000 calls were received in 1981—56 percent from people 24 years old or younger (ASHA, unpublished data). Inquiries were received from all 48 contiguous States and the District of Columbia; the percentage distribution closely paralleled the national population distribution.

Professional education needs no less attention. A critical need exists to educate and update the physician community concerning the management of patients with STDs. The appearance of penicillin in the 1940s and other antibiotics in the 1950s led to the demise of the specialties of venereology and syphilology and a significant decrease in venereology training for medical students. By 1974, the teaching of venereology in our nation's medical schools decreased to 8.2 hours in a typical 4-year curriculum (18,19). In a survey of medical schools conducted in 1981, the number of teaching hours related to STDs had dropped to 6 hours (20). The same survey results indicated that only 22 percent of the medical residency programs offered any training in venereology.

In cooperation with local health departments and

medical schools, CDC began a national training program for clinicians in 1979 to assist States and local areas in refining the diagnostic and therapeutic skills of clinicians directly involved in the management of STD patients. The Model STD Prevention/Training Clinics focus on training physicians, nurses, physician assistants, and others in the health professions. Eight training clinics are operating in Baltimore, Chicago, Cincinnati, Dallas, Los Angeles, Nashville, San Juan, and Seattle. In 1981, they trained 1,669 participants. By the end of 1982, more than 4,500 participants, cumulatively, will have been trained in the management of STD patients.

Implementing 1990 Prevention Objectives

Clearly, both the quality of the services and the attitudes with which they are delivered are important factors in reaching those who need STD services. While existing programs have interrupted the transmission of syphilis and gonorrhea, many vulnerable groups are not yet being served. To approach them effectively will require not only the efforts of STD clinics and their staff, but also those of family planning clinics, private physicians, public health laboratories, and educational institutions.

To provide a measure of progress, national objectives for 1990 have been established as quantifiable goals designed to improve health, reduce risk factors, increase awareness, and improve protection and surveillance (table 3). Of the 11 goals related to STDs and listed in "Objectives for the Nation" (21), the 5 most important priorities for the Federal effort by 1990 are as follows:

1. Reported gonorrhea incidence should be reduced to a rate of 280 cases per 100,000 population. In 1981, the reported case rate was 445.8 per 100,000 population (12).
2. Reported incidence of gonococcal pelvic inflammatory disease should be reduced to a rate of 60 cases per 100,000 females. In 1978, the estimated rate was 130 cases per 100,000 females (12).
3. Reported incidence of primary and secondary syphilis should be reduced to a rate of 7 cases per 100,000 population per year, with a reduction in congenital syphilis to 1.5 cases per 100,000 children under age 1. In 1981, the reported incidence of primary and secondary syphilis was 13.3 cases per 100,000 population; the reported incidence of congenital syphilis was 5.1 cases per 100,000 children under age 1 (12).
4. Every junior and senior high school student in the United States should receive accurate, timely education about STDs. Currently, about 70 percent of school systems provide some information about STDs,

PREVENTION

Table 3. Progress toward quantitative objectives for prevention of sexually transmitted disease, rates per 100,000 population.

Objectives	1978	1979	1980	1981	1982 & 1990	Percent change	
						From 1979	Average annual plan ¹
Gonorrhea:							
Plan		459			280	(-39.0)	(-3.3)
Actual	468.8	465.1	460.8	445.8			
Percent change				(-4.1)			
GPID: ²							
Plan	130				60	(-53.8)	(-4.1)
Actual							
Percent change							
PID outpatient data, NDTI: ³							
Actual		2,969.0					
Percent change		(-31.0 from 1973)					
PID outpatient data, NAMCS: ⁴							
Actual		1,983.0					
Percent change		(-59.9 from 1973)					
Primary and secondary syphilis:							
Plan		11			7	(-36.4)	(-3.0)
Actual	9.8	11.1	12.3	13.3			
Percent change				(+19.8)			
Congenital syphilis: ⁵							
Plan		3.7			1.5	(-59.5)	(-5.0)
Actual	3.5	3.3	3.2	5.1			
Percent change				(+53.8)			

¹ Plan refers to the projected or estimated levels used to establish the broad objectives for 1990.

² Gonococcal pelvic inflammatory disease.

³ Encounters with fee-for-service, office-based physicians (office, hospital, telephone, house call, other); National Disease Therapeutic Index, IMS

America Ltd.

⁴ Visits to fee-for-service, office-based physicians; National Ambulatory Medical Care Survey.

⁵ Rate per 100,000 live births.

NOTE: PID outpatient data are alternative data.

but the quality and timing of the instruction varies greatly.

5. At least 95 percent of health care providers seeing suspected cases should be capable of diagnosing and treating all currently recognized STDs.

The financial resources available to Federal, State, and local public health agencies limit their activities to control efforts that focus primarily on the prevention and control of syphilis and gonorrhea. Therefore, the priority objectives are those which focus on these diseases. We expect that a reduction in serious neonatal infections due to herpes and chlamydia and a reduction in the incidence of nongonococcal infections will also be affected by those STD services delivered by family planning clinics, private physicians, and other medical programs. Progress toward achieving these objectives will be enhanced by the results of research on causes and prevention of these diseases and by improved diagnostic capabilities.

Achievement of the objectives will require activities that supplement those of the Federal Government. State health department representatives could work with their counterparts in the departments of education to ensure that junior high and high school teachers have access to STD teaching resources useful for class-

room instruction. Activities aimed at high-risk populations are also necessary; for example, institutions of higher learning could use student health service programs to provide STD education, treatment, and control services. Similarly, voluntary organizations can support STD information activities such as local VD hotlines.

The range of possible activities contributing toward achievement of the STD objectives has been described in two reports (7,21). The Department of Health and Human Services will support those activities consistent with the Federal role of leading, catalyzing, and providing strategic support. State, local, and private organizations will supplement this effort through activities compatible with their organizational mandate and available resources.

The magnitude of the STD problem is expanding. We have an urgent need for both the public and private medical sectors to recognize the implications of the STD problem confronting us in the 1980s. The growing complexity of STD requires all those providing clinical care for STD patients to employ the most current diagnostic and treatment methods. Also, the scope of and support for STD research needs to be widened. Without the professional community's support, and involvement of the private sector, the inci-

dence of STD will continue to increase at alarming proportions during this decade. The opportunity for promoting health, preventing human suffering, and reducing societal costs is great. Making the best of this opportunity is our challenge during this decade.

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SYNOPSIS

WIESNER, PAUL J. (Venereal Disease Control Division, Centers for Disease Control), and PARRA, WILLIAM C.: *Sexually transmitted diseases: meeting the 1990 objectives—a challenge for the 1980s. Public Health Reports, Vol. 97, September-October 1982, pp. 409-416.*

Sexually transmitted diseases (STDs) represent a major public health problem in the country, cause patients enormous suffering, and cost the nation billions of dollars annually. Demographic, sociological, and behavioral changes in our society

during the past decade are important contributors to the growing complexity and scope of the STD problem.

Several agencies in the Public Health Service are engaged in the Federal effort against STDs. The Centers for Disease Control, as the lead agency, assists State and local health departments in their STD control efforts. In fiscal year 1981, federally supported syphilis and gonorrhea control efforts—based on prevention of an estimated 209,400 new cases—saved the taxpayers approxi-

mately \$150 million.

To meet the 1990 objectives, both the public and private medical sectors must recognize the STD problem of the 1980s. Without the support of the professional community and involvement of the private sector, the incidence of STDs will continue to increase at alarming proportions during this decade. The opportunity for promoting health, preventing human suffering, and reducing costs to society is great. Making the best of this opportunity is our challenge during this decade.

Sex Differentials in Health

LOIS M. VERBRUGGE, MPH, PhD



IT IS COMMON KNOWLEDGE that females tend to live longer than males in the United States and that female death rates are lower than male rates for all age groups and for most leading causes of death. But while they are alive, females' health seems to be worse than males'. Health surveys repeatedly show that females have higher rates of illness, of disability days, and of health services use. Intuitively, these statements seem contradictory. Why should the sex with a health disadvantage end up with a mortality advantage?

After reviewing sex differentials in health for the United States and offering explanations for them, I will look at the contradiction of higher female morbidity but higher male mortality and suggest why it occurs. Definitions of the terms used in this paper and the data sources for the statistics cited are listed on pages 434-435.

Mental health is not considered in this paper. Sex differentials in mental health have been presented recently by several researchers (1-5).

Acute Conditions

The National Health Interview Survey (NHIS) of the National Center for Health Statistics collects extensive data on incidence rates for acute conditions and on disability from those conditions. In addition, findings in several community studies have provided medical measures of acute conditions. The interviews and medical data both show higher rates of acute illnesses for fe-

males, but higher injury rates for males. Restricted activity for acute conditions is greater for females.

Incidence. According to interview data, 12 percent more females than males had acute conditions in 1980 (table 1), and there was a similar elevation in earlier years. The female excess appears for infective and parasitic diseases, respiratory conditions, digestive system conditions, and "all other acute conditions." The fourth group includes problems due to pregnancy and childbirth; even when these are removed, female rates for "all other acute conditions" exceed male rates.

There are some intriguing differences for specific conditions (data not shown) within the four groups in table 1. The gap between female and male rates is very large for genitourinary disorders and for headaches. It is also sizable for unspecified viruses, influenza, bronchitis, upper gastrointestinal disorders, and musculoskeletal problems. The more complex reproductive system and menstrual problems of females probably account for their higher rates of genitourinary ailments, but their excess rates for other problems—especially for headaches and stomach-intestinal troubles—are curious. There is no obvious reason that females have higher physical risks for these conditions than males do.

For injuries, males have higher rates than females. This finding is compatible with males' generally greater exposure to health hazards from their jobs, travel, and sports.

Medical data on the incidence of acute conditions are scarce since continuous surveillance of a population, with specimens taken and tested when people feel ill, is required to obtain such information. There have been no such studies on a national sample, but two

Dr. Verbrugge is associate research scientist in the School of Public Health and faculty associate in the Institute for Social Research, University of Michigan. Tearsheet requests to Lois M. Verbrugge, PhD, Institute for Social Research, University of Michigan, P.O. Box 1248, Ann Arbor, Mich. 48106.

Table 1. Incidence of acute conditions and restricted activity for acute conditions, by sex, United States 1980

Condition group or age group	Acute conditions per 100 persons per year			Restricted activity days per 100 persons per year			Bed disability days per 100 persons per year			Restricted activity days per condition		Bed disability days per condition		School loss or work loss days per 100 persons per year ¹		
	M	F	F:M	M	F	F:M	M	F	F:M	M	F	M	F	M	F	F:M
Condition																
All acute conditions ..	204	239	1.12	870	1,096	1.26	354	495	1.40	4.3	4.6	1.7	2.1			
Infective and parasitic diseases	23	26	1.13	86	102	1.19	46	55	1.30	3.7	3.9	2.0	2.1			
Respiratory conditions	104	128	1.23	379	482	1.27	190	251	1.32	3.6	3.8	1.8	2.0			
Digestive system conditions	11	12	1.09	37	53	1.43	18	25	1.39	3.4	4.4	1.6	2.1			
Injuries	39	28	0.72	255	189	0.74	62	57	0.92	6.5	6.8	1.6	2.0			
All other acute conditions:																
Including pregnancy and delivery problems	27	46	1.70	113	270	2.39	37	106	2.86	4.2	5.9	1.4	2.3			
Excluding pregnancy and delivery problems	27	41	1.52	113	203	1.80	37	79	2.14	4.2	5.0	1.4	1.9			
Age group																
Under 6 years	394	406	1.03	1,266	1,122	0.89	603	559	0.93	3.2	2.8	1.5	1.4			
6-16 years	284	292	1.04	945	1,015	1.07	416	512	1.23	3.3	3.4	1.5	1.7	...	...	...
17-44 years	190	254	1.34	839	1,114	1.33	312	510	1.63	4.4	4.4	1.6	2.0	432	544	1.26
45 years or older	111	147	1.32	741	1,107	1.49	296	450	1.52	6.7	7.5	2.7	3.1	254	380	1.50

¹ School loss days are for children 5-16 years. Work loss days are for employed persons 17-44 years and 45 years and older. 1980 data not available by condition for work or school loss days.

SOURCE: National Center for Health Statistics, Vital and Health Statistics, Series 10, No. 139.

KEY: ... inapplicable. M male. F female. F:M ratio of number for females to number for males.

community studies have shown higher incidence rates for females at most ages. In the Tecumseh, Mich., studies, acute respiratory illness was more common among females than males after age 3 years (6,7). The sex differentials appear for adults whether there are children in the household or not, so the difference cannot be attributed solely to mothers' higher risks of infection from their greater contact with children. Similarly, women in a Cleveland study had higher rates of respiratory disease and acute gastrointestinal illness than men (8).

Do the sex differentials in NHIS data and the medical data sources reflect true physical status differences? Not entirely; consider how the data are collected. In NHIS, an acute condition is counted only if it resulted in restricted activity or medical care. In effect, health behavior is included in the morbidity rates. Incidence rates could be similar for males and females, but if one sex tends to take more curative actions, a sex differential will appear. In the community studies, each participating household had a designated informant who told researchers when a family member had symptoms; a specimen was then obtained from that family member. Informants are not

always aware of family members' symptoms and, therefore, illnesses may not be recorded. Because most informants were women, illness rates were probably underestimated for men, and possibly for children too. Incidence rates could be similar for men and women, but the proxy reporting by women would lead to sex differentials in the rates. Overall, the interview and medical data suggest that females have higher incidence rates of acute conditions, but this conclusion may be affected by the confounding effects just mentioned.

Restricted activity for acute conditions. Since females apparently have more acute health problems, it is not surprising that they limit their usual activities and have more days of bed disability per year than males do. In 1980, females' restricted activity rates were 26 percent higher than males', and their bed disability rates were 40 percent higher. These gaps are larger than the 12 percent difference in incidence rates. Consequently, females have more restricted activity per condition than males do. In 1980, they averaged 4.6 restricted activity days per condition and 2.1 bed disability days, compared to 4.3 and 1.7 for males. Short-term disability rates in table 1 are higher for females

for all five groups of acute conditions—including injuries. For the “all other acute conditions” category, the female excess persists even when pregnancy and childbirth events are removed.

Sex differentials by age. The largest sex differentials for acute conditions appear during adult years—sometimes at women's reproductive ages (17–44), sometimes at older ages (45 or more). There is a smaller female excess for girls 6–16 years.

Among children under 10 years, however, sex differentials show a strikingly different picture: young boys tend to have higher rates of acute conditions and acute disability than young girls. In NHIS findings, boys have higher rates for respiratory conditions (except influenza), injuries, and all other acute conditions. Medical data from the community surveys also show higher rates of acute respiratory illness and gastrointestinal illness among boys. Boys have more days of disability per condition than girls do, especially for respiratory problems. This observation suggests that boys' problems are more serious, and surveillance data confirm that boys have more severe types of acute respiratory conditions. Year after year, NHIS shows elevated morbidity for boys; it is especially pronounced for children under 10 years old.

There is one interesting anomaly in the NHIS data for children: girls have more school-loss days per year than boys. This statistic suggests that girls are more likely to stay home when ill, whereas boys try to attend school anyway.

Chronic Conditions

Numerous surveys have yielded information about chronic health problems. Both NHIS and the National Health and Nutrition Examination (NHANES) have interview data on chronic conditions. In addition, the National Hospital Discharge Survey (NHDS) provides hospital discharge rates for specific chronic conditions. The National Health Examination Survey (NHES) and NHANES also have collected medical measurements for some conditions through physical examinations. NHIS and the U.S. Bureau of the Census have collected information on people's limitations from chronic conditions. A review of all these sources indicates that sex differentials are complex and not always consistent. In general, it appears that women have more chronic conditions than men do, but their conditions are less severe and are not usually life-threatening.

Prevalence. NHES and NHANES have medical data on some specific conditions (heart disease, hypertension, arthritis) and on symptoms associated with high blood pressure, high blood glucose levels, low blood

hematocrit counts, and high serum cholesterol levels. Table 2 presents selected data on rates for adults.

Until about 45–50 years of age, more men have problems with heart disease, hypertension, and high serum cholesterol levels; after that age, the rates for the women begin to exceed the rates of the men. Although men over age 45 continue to have the higher rates for coronary heart disease, women 45 and older have strikingly higher rates of hypertensive heart disease, more hypertension, and higher serum cholesterol.

At all adult ages, women have a higher prevalence of anemia (low blood hematocrit counts), diabetes (high blood glucose levels), moderate and severe osteoarthritis, and rheumatoid arthritis than men. Men experience more cases of mild arthritis and more skin problems.

Community studies in Tecumseh, Mich., (9) and Framingham, Mass. (10,11) also provided examination data. Tecumseh showed sex differentials similar to NHES and NHANES for coronary heart disease, hypertensive heart disease, diabetes, osteoarthritis, and rheumatoid arthritis (9). In addition, Tecumseh men had higher rates of chronic bronchitis than women at all ages. At all or most ages, women had higher rates of goiter, cancer, and rheumatic heart disease. Sex differentials for stroke and asthma “flipflop” across age groups. The Framingham study focused on cardiovascular morbidity and mortality of middle-aged and older adults. With few exceptions, men in these age groups had higher rates of diagnosed coronary heart disease and stroke (cerebrovascular accident) than women (10,11).

From 1957 to 1967, NHIS interviewers asked people if they had any chronic conditions and, if so, how many. The data showed that females were more likely to have a chronic condition than males (12). For example, in 1957–58, 64 percent of all women aged 45–64 reported having one or more chronic conditions, compared with 58 percent of men those ages. For ages 65 and older, the proportions were 81 percent for the women and 75 percent for the men.

Prevalence rates for specific conditions are available for NHIS, NHANES (medical histories), and NHDS. The various surveys' questions about chronic conditions differed considerably, so that it is not surprising that sex differentials vary across them. However, for a particular chronic condition, the same sex is always disadvantaged in the several surveys, with rare exceptions. This consistent picture appears even for specific age groups. Table 3 summarizes results from the surveys.

For the majority of conditions, females had higher prevalence rates. The most important rates are for

Table 2. Prevalence of chronic conditions and symptoms among adults, based on medical examinations, United States

Chronic condition or symptom	Percent		Which sex has higher rates? ¹
	Men	Women	
Heart disease, NHES			
Definite heart disease	12.6	13.7	Men to age 55, then women
Rheumatic heart disease	1.2	1.1	...
Hypertensive heart disease	7.7	11.1	Men to age 50, then women
Coronary heart disease	3.7	2.0	Men
Congenital heart disease	0.3	0.1	...
Syphilitic heart disease	0.2	0.1	...
Other heart disease	0.2	0.3	...
Suspect heart disease	13.9	9.7	Men except ages 55-64
Hypertensive heart disease	5.1	3.5	Men except ages 55-64
Coronary heart disease	2.2	2.2	Men to age 40, then women
Other heart disease	7.8	5.5	...
Hypertension			
Definite hypertension, NHES	14.1	16.4	Men to age 50, then women
Definite hypertension, NHANES	19.2	17.1	Men to age 55, then women
Borderline hypertension, NHES	17.2	12.2	Men except those 75 and older
Borderline hypertension, NHANES	21.3	15.6	Men except those 65 and older
Arthritis, NHES ²			
Osteoarthritis	37.4	37.3	Men to age 54, then women
Mild osteoarthritis	31.2	26.3	Men except rates are equal for 55-64 group
Moderate or severe osteoarthritis	6.2	11.0	Women
Rheumatoid arthritis	1.7	4.6	Women
Skin conditions, NHANES, ages 1-74			
Significant skin pathology	34.0	28.7	Men
Needs care ("not now under best care")	9.3	7.2	Men
Symptoms of chronic diseases ³			
Average blood glucose, NHES (mg per 100 ml)	115.7	126.4	Women
Average hematocrit count, NHES (mg per 100 ml)	46.5	42.4	Men (less anemia)
Average serum cholesterol ⁴ , NHES (mg per 100 ml)	217.4	223.1	Men to age 45, then women
Average serum cholesterol ⁴ , NHANES (mg per 100 ml)	221.8	224.9	Men to age 45, then women
Percent with serum cholesterol of 260 mg per 100 ml or higher, NHES	17.6	22.7	Men 25-44, women 18-24 and 45 and older
Percent with serum cholesterol of 260 mg per 100 ml or higher, NHANES	14.7	17.5	Men 25-44, women 18-24 and 45 and older

malignant neoplasms, benign and unspecified neoplasms, thyroid conditions, diabetes, anemia, rheumatic heart disease, hypertensive heart disease, hypertension, digestive system conditions (except peptic ulcer and hernia), diseases of the urinary system, arthritis, and rheumatism. But males had higher rates for some chronic problems—tuberculosis, gout, ear problems, coronary heart disease, cerebrovascular disease, arteriosclerosis, emphysema-asthma, peptic ulcer, hernia, slipped disc, congenital anomalies, and impairments.

If one compares the interview and hospital records data (table 3) with the medical examination data (table 2), the agreement is high. The same sex tends to have higher rates in both tables. The sex differentials, therefore, are robust across different kinds of data—showing at least which sex is disadvantaged. The levels of the rates and the size of sex differentials do

vary, an interesting topic in its own right that will be covered in another report by the author.

Several inconsistencies in tables 2 and 3 are intriguing. First, females of all ages report more hypertensive heart disease and hypertension at all ages, but medical examinations show higher rates for them only after age 50. Possibly, men under 50 are less likely than women to have their hypertension diagnosed. Second, more females of all ages report arthritis, and they have more medically severe cases; but males show higher prevalence of mild cases. Possibly, males tend to ignore the aches of arthritis and are not diagnosed early; this circumstance would lead to underreporting in interviews. NHANES has medical history data on people's experience of prolonged joint pain and medical care for joint pain, which buttress this interpretation.

Table 2 (continued). Prevalence of chronic conditions and symptoms among adults, based on medical examinations, United States

Chronic condition or symptom	Percent		Which sex has higher rates? ¹
	Men	Women	
Dental status			
1 or both arches edentulous, NHES	24	30	Women
1 or both arches edentulous, NHANES	10	12	Women
Average DMF score, NHES ³	17.2	18.5	Women
Average DMF score, NHANES ³	12.4	13.5	Women
Periodontal disease, NHES	79	69	Men
Periodontal disease, NHANES	46	36	Men
Person needs dental care, NHES ⁴	45	36	Men
Person needs dental care, NHANES ⁴	68	61	Men
Vision status			
Binocular visual acuity, uncorrected, NHES ² :			
Distance vision 20/100 or worse	13	21	Women
Near vision 14/70 or worse	31	35	Women
Monocular visual acuity, corrected, NHANES: distance vision			
20/50 or worse in better eye	2.9	3.6	Women except for 6-11 and 55-64 age groups
Hearing status, NHES ⁴			
Median hearing level for better ear:			
1,000 cycles per second	-5	-6	Higher (worse hearing) for men to age 65, then women
3,000 cycles per second	-1	-4	Higher for men
6,000 cycles per second	+20	+9	Higher for men
Ability to hear speech	-3	-5	Higher for men

¹ Age-specific rates are provided in the sources for most conditions and symptoms. The sex indicated has higher rates for all age groups, except where noted.

² NHANES provides data for specific joints, and also respondents' reports of prolonged pain in specific joints; see Series 11, No. 213.

³ High blood glucose is a sign of diabetes mellitus; low hematocrit is a sign of anemia; and high serum cholesterol is associated with coronary heart disease.

⁴ Rates are age-adjusted to the age-sex distribution of the total U.S. population for each survey period.

⁵ Sum of decayed, missing, filled, and nonfunctional teeth. It is calculated for dentulous persons only.

⁶ For NHES, need-for-care was determined by the examining dentist,

based on the presence and severity of periodontal disease, the number of decayed and missing teeth, and any other clinical finding. The data are for dentulous persons only. For NHANES, a broader definition of needs was used; see Series 11, No. 214. Data are for all adults.

⁷ Figures are for whites; those for blacks show similar sex differentials.

⁸ For details about the test, see Series 11, No. 11. NHANES reports distributions of hearing levels (rather than medians); see Series 11, No. 215.

SOURCE: National Center for Health Statistics, Vital and Health Statistics, Series 11, Nos. 6, 7, 11-13, 15, 17, 18, 22, 24, 25, 36, 201, 203, 205, 212-215.

KEY: NHES National Health Examination Survey, 1960-62 (ages 18-79). NHANES National Health and Nutrition Examination Survey, 1971-74 (ages 18-74, except where noted). . . . No age-specific rates are available.

According to all sources, then, females appear more troubled by chronic conditions, especially after ages 45-50. But the shorter list of conditions with an excess among males is ominous because many of these conditions are leading causes of death (coronary heart disease, cerebrovascular disease, arteriosclerosis, pneumonia, emphysema-asthma, peptic ulcer, congenital anomalies) or are problems closely linked to leading causes (injuries, which are linked to accident and homicide mortality). Cancer is missing from the shorter list; females consistently report higher cancer rates in health surveys, but cancer mortality rates are higher for males. Possibly, cancer is detected and controlled earlier for females; in contrast, males are less aware of the disease in its early stages and their cases are less amenable to control after diagnosis. If so, this accounts for underreporting of males' cases in health

interviews, despite the likelihood that males actually have higher cancer incidence rates.

Sensory, dental, and nutritional statuses. Women have better dental status and better hearing than men. But women have worse uncorrected vision, and their nutritional status appears worse. Some details follow. First, although women have fewer natural teeth and more signs of prior dental work, they have less periodontal disease and less need for immediate dental care (table 2). Second, medical data show that women have worse uncorrected vision (without glasses or contact lenses) than men (table 2). However, men have more visual impairments such as detached retina, color blindness, or severe vision problems even with glasses (table 3). Color blindness is a genetic problem, so these data do reveal a biological disadvantage for

Table 3. Sex differences in chronic conditions (and several acute conditions) for adults, based on health interviews and hospital records, United States

Condition ¹	Which sex has higher rates? ²
Infective and parasitic diseases: tuberculosis ^{3,5}	Males
Neoplasms:	
Malignant neoplasms ^{4,6}	Females except for males 65 years and older in ⁴ and ⁶
Benign neoplasms and neoplasms of unspecified nature ^{4,6}	Females
Endocrine, nutritional, and metabolic diseases:	
Thyroid conditions ^{3,5}	Females
Diabetes ^{3,6}	Females
Gout ^{3,5}	Males
Diseases of the blood and blood-forming organs:	
Anemia, all forms ³	Females
Coagulation defects ⁵	Females
Mental disorders: mental and nervous conditions ^{4,5}	Females
Diseases of the nervous system and sense organs:	
Epilepsy or chronic convulsions ³	Females except equal rates for 45 years and older
Migraine ³	Females except equal rates for under 17 years
Sciatica ³	Females
Neuralgia and neuritis ³	Females
Cataract ⁶	Females
Diseases of the ear and mastoid process ⁶	Males
Diseases of the circulatory system:	
Heart conditions ^{3,5}	Males except for females 17-44 years in ³
Active rheumatic fever and chronic rheumatic heart disease ^{3,5}	Females
Hypertensive heart disease ³	Females
Coronary (ischemic) heart disease ^{3,5,6}	Males
Other specified heart disease, including heart murmur ^{3,5}	Females except for males under 17 years
Ill-defined heart disease ("heart trouble") ³	Males
Hypertensive disease without heart involvement (also called hypertension or high blood pressure) ^{3,5}	Females
Cerebrovascular disease (stroke) ^{3,6}	Males
Arteriosclerosis ^{3,6}	Males
Varicose veins ^{3,6}	Females
Hemorrhoids ^{3,6}	Females in ³ , males in ⁴
Other circulatory system conditions, for example, phlebitis, thrombophlebitis ^{3,5}	Females
Diseases of the respiratory system:	
Pneumonia, all forms ⁶	Males
Chronic bronchitis ^{3,5}	Females 25-54 years, but males at younger and older ages
Emphysema ^{3,6}	Males
Asthma ^{3,5}	Males except for females 45-64 years
Chronic sinusitis ^{3,6}	Females except for males under 17 years in ⁴
Hay fever ^{3,5}	Females except for males under 25 years in ³ and ⁵ and males of all ages in ⁴
Pleurisy ^{3,5}	Females
Chronic cough ⁵	Males

males. Men's other visual impairments may be due to delayed or incomplete care of eye problems. This speculation would explain why fewer women suffer severe vision impairments even though more of them have imperfect vision. Third, table 2 shows that women have better hearing at all frequencies than men do. Fourth, dietary intake reports show that males of all ages consume more nutrients (such as protein, calcium,

iron, vitamins) than females do (13). Clinical data on nutritional deficiencies indicate that females' rates are higher than males' for niacin, vitamin A and essential fatty acids, iodine, and calcium (14). Larger percentages of males have signs of deficiency for protein, vitamin C, and vitamin D. Females actually tend to choose foods with higher nutritional value than males do but, because they eat less, females end up with

Table 3 (continued). Sex differences in chronic conditions (and several acute conditions) for adults, based on health interviews and hospital records, United States

Condition ¹	Which sex has higher rates? ²
Diseases of the digestive system:	
Peptic ulcer ^{3,4}	Males
Hernia ^{3,4}	Males
Enteritis and colitis ^{3,5}	Females
Gallbladder conditions ^{3,5}	Females
Other digestive system conditions ^{3,4}	Females for most titles
Diseases of the genitourinary system: diseases of the urinary system (kidney, ureter) ^{3,5}	Females except for males 55-64 years in ³
Diseases of the skin and subcutaneous tissue:	
Eczema, dermatitis, and urticaria (hives) ^{3,5}	Females
Allergies, all types ⁵	Females
Psoriasis and similar disorders ³	Females except for males 45 years and older
Corns and callosities ³	Females
Diseases of nail ³	Females except for males under 17 years
Diseases of sebaceous glands (acne) ³	Males
Diseases of the musculoskeletal system and connective tissues:	
Arthritis ^{3,6}	Females
Rheumatism ³	Females except for males 65 years and older
Displacement of intervertebral disc (slipped disc) ³	Males
Bunion ³	Females
Synovitis, bursitis, and tenosynovitis ³	Females
Congenital anomalies ⁶	Males
Accidents, poisonings, and violence:	
Fractures, all sites ^{5,6}	Males until late middle age, then females
Sprains and strains of back, including neck ⁶	Females
Lacerations and open wounds ⁶	Males
Impairments:	
Visual impairments ^{3,4}	Males except for females 65 years and older
Hearing impairments ^{3,4}	Males
Speech defects ³	Males
Paralysis, complete or partial ^{3,5}	Males except for poliomyelitis, which has higher rates for females
Absence of major extremity, finger, or toe ³	Males
Orthopedic impairments of back, spine, upper extremity, shoulder, lower extremity, or hip (excludes paralysis or absence) ^{3,4}	Males except for females 65 years and older for most sites. Also back and spine has higher rates for females under 45 years

¹ Condition titles are those of the International Classification of Diseases 8th Revision. Impairments are classified by a special scheme developed by the National Center for Health Statistics. The acute conditions included are pneumonia, fractures, sprain and strains, and lacerations and open wounds.

² Age-specific rates are provided in the sources for most conditions. The sex indicated has higher rates for all or almost all age groups, except where noted. Data from 4 national surveys are identified by footnote numbers.

³ National Health Interview Survey, supplement questionnaires, 1968-73. Interviewers named specific conditions and asked if respondents had experienced them in the past 12 months.

⁴ National Health Interview Survey, standard questionnaire 1974. Re-

spondents were asked if they are limited in activities or mobility by a chronic condition; if so, they named the condition.

⁵ National Health and Nutritional Examination Survey, medical history questionnaire, 1971-74. For specified conditions, respondents were asked: "Has a doctor ever told you that you had . . . ?" and "Do you still have . . . ?"

⁶ National Hospital Discharge Survey, 1975. Main diagnosis at discharge. SOURCE: For the NHIS supplements, National Center for Health Statistics, Vital and Health Statistics, Series 10, Nos. 83, 84, 92, 94, 99, 109, 124. For the NHIS Standard Questionnaire: calculated from NCHS, Vital and Health Statistics, Series 10, No. 111. For NHANES, unpublished tabulations provided by NCHS. For NHDS: NCHS, Vital and Health Statistics, Series 13, No. 35.

more nutritional deficiencies. Obesity is another indicator of nutritional problems, and skinfold tests show that women are more likely to be obese than men (14).

Disability from chronic conditions. Serious chronic diseases and impairments force people to change their work and recreational activities, and they can hamper physical activity and mobility. Data on chronic dis-

ability are difficult to interpret in a medical sense because limitations depend not only the kind of condition and its severity, but also on the person's social roles and obligations.

Because of the prevalence data cited previously, more women might be expected to have limitations, but probably milder ones than men. Moreover, if women tend to accept limitations more readily, this

Table 4. Disability due to chronic conditions, by sex and age, United States (percentages)

Type of disability	Age group (years) and sex							
	Under 17		17-44		45-64		65	
	M	F	M	F	M	F	M	F
Limitation in social activities, NHIS 1980:								
Limited in major activity	2.3	1.8	5.8	5.3	20.2	17.4	44.2	35.3
Limited in secondary activity only	2.0	1.5	3.4	2.8	5.1	5.2	4.6	7.4
Has no chronic condition or has one that does not limit social activities	95.7	96.7	90.8	91.9	74.7	77.4	51.2	57.3
Mobility limitation, NHIS 1972: ¹								
Confined to the house	(²)	(²)	0.2	0.1	1.2	1.4	5.0	5.4
Needs help in getting around	(²)	(²)	0.2	0.2	1.2	1.0	6.0	7.2
Has trouble getting around alone	0.1	0.1	0.5	0.4	2.6	2.3	5.4	6.1
Has no chronic condition or has one that does not limit mobility ..	99.7	99.7	99.0	99.1	95.0	95.4	83.8	81.4
			18-44		45-64		55-64	
			M	F	M	F	M	F
Work disability, 1970 census:								
Complete (cannot hold a job)			1.7	2.3	4.4	6.6	10.8	13.4
Partial (limited in kind or amount of work at a job)			5.9	3.4	10.4	6.5	13.5	6.1
	Rates per 100 persons per year							
	Under 17		17-44		45 and older			
	M	F	M	F	M	F		
Short-term disability for chronic conditions, NHIS, 1980: ³								
Restricted activity days for chronic conditions	102	118	501	561	2,061	2,246		
Bed disability days for chronic conditions	31	10	123	172	587	711		
School loss or work loss days for chronic conditions ⁴	49	3	114	119	246	187		

¹ Percents in a column may not add to 100.0 because of rounding.² Less than 0.5 percent.³ Computed by author from data in Vital and Health Statistics, Series 10, No. 139.⁴ School loss days are for children 6-16 years; work loss days are for currently employed people 17-44 years and those 45 and older.

KEY: M male, F female.

SOURCE: For NHIS, National Center for Health Statistics, Series 10, Nos. 96, 139. For the census, U.S. Bureau of the Census: "1970 Census of Population. Persons with Work Disability." Subject Report PC (2)-6C, 1973.

factor would also increase their disability rates. On the other hand, if men's roles are more physically demanding, men with chronic conditions will encounter problems more readily and they will be forced to accept limitations. The data examined subsequently are consistent with these interpretations, but do not prove them.

In NHIS, men are asked if they are now able to work at a job or business. Women who were mainly employed in the past year are asked about job limitations; women who have been housewives in the past year are asked about housework limitations. People who report chronic limitations are asked if they are completely unable to do their main activity (of the past year), if they have partial restrictions, or if only secondary activities are limited. Table 4 shows that at all ages, more males are limited in performing their usual activity. Among people who have some limitation, males are much more likely than females to have

complete limitation (data not shown). More females, therefore, have partial limitation. Before age 45, males also report more problems in their secondary activities. It appears that males' chronic conditions are more severe—less frequent, but more advanced.

The census data on work disability are quite different. People were asked if they cannot hold a job at all because of a health problem or if they are limited in the kind of job or amount of work at a job. At all ages, more men reported partial work disability, but more women reported complete disability.

This contradiction is resolved by the wording of the NHIS and census questions. NHIS asks men about job disability, but women were asked about either housework or job disability. The census asks everyone about job disability. Women with health problems who quit their jobs or never seek employment probably report few housework limitations to NHIS, but to the census interviewer they say that they cannot work. By con-

trast, men probably feel greater pressures to work and therefore stay in the labor force even when quite ill. They make adjustments, such as changing their specific tasks or changing the type of job, but they resist quitting altogether. In NHIS then, more men would report problems in usual activity (job), and for the census they report partial rather than complete disability. This interpretation is buttressed by census data on the duration of work disability (data not shown). Sex differences are not large, but they indicate that partially disabled men have had their problem longer than comparable women, but completely disabled women have been troubled longer than comparable men. This observation is consistent with the notion that chronically ill men try to remain employed, but women leave the labor force or remain outside it more readily.

In sum, both NHIS and census data suggest that men have more severe chronic conditions. But social factors also affect men's and women's role occupancy and performance; these factors can obscure physiological differences.

Women seem more troubled by limitation in mobility and short-term disability for chronic conditions. More middle-aged women are confined to the house and, at elderly ages, more women have mobility problems of all kinds (table 4). Only in the middle-age groups do men show an excess—and only for mild mobility problems. On a short-term basis, more women also reduce their daily activities for chronic problems. They have higher rates of restricted activity and bed disability for chronic conditions. Among employed people, however, men equal or exceed women in work-loss days for such problems.

From a medical perspective, women's conditions could be considered more severe, but there is another interpretation, involving social factors. If men resist confinement to home and do their best to get around and keep working, they may actually have worse medical conditions but less disability. By contrast, if women

are more willing or able to take time off when chronic conditions flare up, their actions could account for their higher limitation. Also, for people 65 or older, the higher rates for women partly reflect their older average age than men in that age group.

Institutionalization. People with extremely serious chronic diseases or impairments are sometimes institutionalized. They enter chronic disease hospitals, homes for the aged and dependent, or mental hospitals. Table 5 shows census data on institutional residents for 1960 and 1970. Mental hospitals are included since some residents have physical as well as mental problems. At all ages, males were more likely to be in chronic disease hospitals and mental hospitals. Up to age 65, they also had higher residence rates in homes for the aged and dependent but, after age 65, females had higher rates of residence in these homes.

The Resident Places Survey (RPS) shows that male residents under 65 years are sicker than female residents those ages (15,16). More of the men require nursing care because they cannot take care of their personal needs, and they tend to have more chronic conditions. At age 65 and older, women residents are sicker according to all indicators.

The data on institutionalized persons suggest that men under age 65 are more seriously ill from chronic problems. But important social factors are involved in decisions to institutionalize people, especially role expectations and availability of home care (17). Disabled men under 65 may be very upset and hard to care for, since they are "supposed to be working" and want to do so. Their wives and other family members may increase job activity in order to boost family income; this leaves the men with less care at home and may lead to earlier institutionalization for the men, compared to ill women, who may manage to care for themselves better. At the elderly ages, work responsibilities and expectations disappear. Disabled elderly men are

Table 5. Rates per 10,000 population for institutional residence, by sex, United States, 1960 and 1970

Type of Institution	1960		1970		Which sex has higher rates? ¹
	Males	Females	Males	Females	
Chronic disease hospital	4	3	5	4	Males
Tuberculosis hospital	7	3	2	1	Males
Home for the aged or dependent	31	43	42	80	Males to 65 years, then females
Mental hospital	43	45	33	24	Males except at ages 75 and over in 1960

¹ Age-specific rates are provided in the sources. The sex indicated has higher rates for all age groups, except where noted. Rates shown are for people 14 years and older.

² Overall rates are higher for females because most people in these institutions are elderly, and elderly women have much higher rates than elderly men. But at all ages under 65, males have higher rates than

females.

SOURCE: U.S. Bureau of the Census: "1960 Census of Population, Inmates of Institutions." Subject Report PC(2)-8A, 1963; "1970 Census of Population, Persons in Institutions and Other Group Quarters." Subject Report PC(2)-4E, 1973.

Table 6. Health services use, by sex and age, United States

Type of health services	Age group (years) and sex											
	Under 17		17-24		25-44		45-64		65-74		75 and older	
	M	F	M	F	M	F	M	F	M	F	M	F
Doctor visits, NHIS 1980 ¹												
Average number of doctor visits per year	4.5	4.3	2.8	5.2	3.4	5.8	4.4	5.7	5.5	7.0	6.7	6.4
Percent who saw a doctor in the past 6 months	59	59	46	65	45	64	54	63	65 and older 65 71			
Ambulatory care, NAMCS 1975 ²												
Average number of ambulatory care visits per year	2.0	1.8	1.5	2.9	1.9	3.6	2.8	4.0	4.0	4.5		
Prior visit status (percent) ³ :												
New patient	15	16	24	20	23	15	13	11	10	8		
Old patient with "old" problem ...	50	47	47	55	53	64	68	69	74	76		
Percent of problems considered "serious" or "very serious" by the doctor	12	10	15	10	21	15	28	21	31	28		
Dentist visits, NHIS 1980 ⁴												
Average number of dentist visits per year	1.5	1.9	1.2	2.0	1.6	1.9	1.7	1.9	1.3	1.4		
Percent who saw a dentist in the past 6 months	35	37	33	39	36	40	35	38	24	26		
Hospital stays, NHIS 1972, 1980 ^{5,6}												
Discharges per 1,000 persons per year, 1980	69	56	79	190	86	208	103	152	167	164	307	256
Average length of stay, 1980 (days) ..	5.5	4.8	7.3	4.4	7.0	5.0	9.9	7.1	10.7	8.2	9.7	10.3
Discharge rate excluding deliveries, 1972 ⁷	76	67	72	100	83	143	107	173	157	163	284	247
Average length of stay, excluding deliveries, 1972 ⁷	5.9	4.9	6.8	4.7	8.6	6.1	9.8	7.7	11.1	10.0	11.0	12.1

¹ Consultation with a doctor or doctor's assistant, either in person or by telephone, for examination, diagnosis, treatment, or advice.

² Visits to office-based physicians. Telephone calls and visits to emergency rooms and industrial clinics are excluded.

³ An "old" problem is one previously treated by the physician. A third visit-status (old patient with new problem) is not shown.

⁴ Visit to a dentist's office for treatment or advice; services from a technician or hygienist are included.

⁵ Stay in the hospital overnight or longer.

⁶ Discharge rates are also available from the Hospital Discharge Survey. It shows similar sex differentials; see Vital and Health Statistics, Series 13.

⁷ The first 2 age groups are "under 15 years" and "15-24 years."

SOURCE: National Center for Health Statistics, Vital and Health Statistics Series 10, Nos. 107, 139; Series 13, No. 33.

KEY: M male F female.

likely to have a living spouse available to care for them, but disabled elderly women are often widowed and must move to an institution for care. RPS data show that at time of entry into nursing and personal care homes, a higher percentage of the women are widowed. Entering men are more likely to be never married, divorced, or separated (16).

Sex differentials by age. We have looked extensively

at data on chronic conditions, limitations, and institutionalization of adults. A few words are needed about children. Few children have chronic conditions, but the data consistently show that boys are more likely than girls to have such conditions and to be limited by them.

Self Ratings of Health

In health interviews, respondents are often asked to sum up their health status. (Examples of questions are

"Do you consider your health excellent, good, fair, or poor?" and "Compared to other people your age, is your health better, worse, or about the same as theirs?") Women consistently report worse health status than men do. In the 1975 NHIS, 13.5 percent of females said their health was "fair" or "poor," compared to 11.2 percent of males (18). By contrast, 51.3 percent of males and 45.3 percent of females reported "excellent" health. Females' poorer evaluations of their health occur at all ages.

Answers to these questions reflect not only real morbidity but also perception of symptoms, evaluation of their seriousness, and lifetime experiences of illness and injury. Although the questions are simple, the factors that influence answers are complex. Sex differentials in these responses are rich with meaning and should not be interpreted hastily.

Use of Health Services

Women use more outpatient services than men do, but they have similar or lower rates of hospitalization when stays related to reproductive functions are excluded. At all adult ages, women have more physician visits per year and also a shorter time interval since their last visit (table 6). The same is true for dentist visits. These sex differentials are largest in early and middle adult years, and they become small for elderly people. Men are less likely to have a regular source of medical care, and even those with a regular source see a specific physician less regularly than women do (19).

Hospitalization data show a different picture for the sexes; between 17 and 44 years, women have higher annual discharge rates for short-stay hospitals, but for

older age groups, men have higher rates. The gap for the 17-44 age group is partly influenced by women's stays for childbirth. When these stays are excluded, the gap narrows, but it does not entirely disappear. When all sex-specific conditions are excluded (mainly disease of prostate and female reproductive disorders), the sex differential does virtually disappear for ages 17-44 (20,21). In sum, for conditions which both sexes can have, men and women 17-44 are equally likely to be hospitalized. After about age 50, men have notably higher hospitalization rates. And at all ages except 65 and older, men tend to have longer hospital stays than women. This statement remains true when childbirth and other sex-specific problems are excluded.

Men's higher hospitalization rates after age 50 and their longer hospital stays at most ages suggest that they have more serious conditions. Women may indeed experience acute and chronic conditions more often, but if those conditions are less serious, they can manage with outpatient care. In addition, women may be more willing and able to seek outpatient medical help when ill. So, even if the sexes had similar illness and injury rates, the rates of physician and dentist visits for women would be higher.

For children, the evidence points uniformly to more health services for boys. They have more physician visits, higher hospitalization rates, and longer hospital stays. When visiting a physician, they are more likely to be "old" patients than "new" ones, to receive treatment for an "old" problem, and to be diagnosed as having a serious problem (22). Only one indicator shows more health services for girls—they receive more dental care than boys do.

Table 7. Use of prescription and nonprescription drugs, by sex

Type of drug	Age group (years) and sex									
	Under 17		17-24		25-44		45-64		65 and older	
	M	F	M	F	M	F	M	F	M	F
Prescription drugs, United States, 1973										
Average number of acquisitions per year ¹	3.0	3.1	2.3	5.7	3.4	7.3	6.7	9.5	11.2	14.3
Average cost per purchase	\$3.60	\$3.70	\$4.30	\$3.80	\$4.90	\$4.50	\$5.70	\$5.30	\$5.50	\$5.30
	Under 2		2-5		6-14		15-44		45-64	
	M	F	M	F	M	F	M	F	M	F
Medicine use, Baltimore, 1968-9										
Percent using prescribed medicine in the past 2 days	21	30	18	18	13	13	14	26	31	44
Percent using nonprescribed medicine in the past 2 days	14	23	22	21	18	19	32	42	26	34

¹ Number of acquisitions equals the number of different prescriptions filled times the number of times each was (re)filled.
SOURCE: For United States, 1973: National Center for Health Statistics,

Vital and Health Statistics, Series 10, No. 108. For Baltimore, 1968-69: references 29,35.
KEY: M male, F female.

Drug Use

In this section I will review data on prescription and nonprescription drugs used for medical purposes; drug use for nonmedical and recreational purposes is excluded. In most surveys interviewees are asked about "prescribed" and "nonprescribed" medicines. The first group includes both prescription-only drugs and recommended over-the-counter drugs.

NHIS data show that females obtain more prescribed medicines per year, especially at ages 17-44 (table 7). Males are slightly more likely to obtain medicines with no out-of-pocket expense—in other words, obtained free from a physician or public organization, or paid entirely through health insurance. When some out-of-pocket payment is required, males pay more for their medicine than females do. But when total expenses for prescribed drugs are added up, females spend more per year (19,23,24).

Other surveys also show greater use of prescribed drugs by females (25-29). Women are especially heavy users of psychotherapeutic drugs compared with men (30-32). Women often report that they take pills to relieve stress, whereas more men report alcohol consumption for stress (26,30). It is sometimes claimed (but remains to be demonstrated) that physicians prescribe psychotherapeutic drugs more readily for women than men for the same complaint. I have discussed this issue further elsewhere (33,34).

Females of all ages also use nonprescribed drugs more frequently than males do (25,27,28,35). Some common examples are cold pills, tonics, cough medicine, and aspirin. Females are especially likely to use pain relievers (35). When total expenses for nonprescribed drugs are added up, males and females spend about the same amount per year (19). This suggests that the per-item cost is lower for women.

What do the sex differentials in drug use imply? The data on prescriptions may reflect more frequent illness for females, but more serious problems for males (if we assume that more expensive medicines are for more serious problems). Alternatively, physicians may overprescribe drugs, recommending more medication to female patients than to male patients with the same ailment. But females' drug use is certainly influenced by their more frequent use of health services. If the probability of getting a prescription during a visit is the same for both sexes, females still get more prescriptions because they see physicians more often. The statistics on nonprescribed drugs also allow several interpretations. Females may be more ill from acute problems and therefore buy more drugs to relieve their symptoms. Or they may be more likely to self-medicate when they feel symptoms; in other words, symptom

Table 8. Preventive health behaviors, by sex, United States (percentages)

Preventive behavior	Males	Females
<i>Vitamin use</i>		
Using vitamins now ¹	19	25
Using "tonics for the blood" now ¹	3	4
Regularly use vitamin pills or vitamin supplements ²	27	40
<i>Reducing diet</i>		
On reducing diet sometime in past 3 years ¹ ..	16	31
On reducing diet now ¹	5	14
On a reducing diet ²	2	6
<i>Exercise</i>		
Exercise regularly ⁴	44	45
Walk for exercise	38	41
Ride a bicycle	16	17
Swim	16	10
Do calisthenics	12	14
Jog	8	3
Lift weights	5	1
Other	6	4
Percent who "often": ²		
Take long walks	37	36
Ride a bicycle	10	12
Swim in the summer	27	25
Do calisthenics or physical exercise	27	28
Go jogging or running	16	9
Work on a physically active hobby, such as dancing or gardening	45	44
Other active sports	32	17
Participated in 1 or more sport in past 12 months ³	47	36
Participated as a member on an organized team	14	8
Participated in tournaments, as an individual or as a team member	10	4
<i>Eating and sleep</i>		
Eat breakfast almost every day ²	53	56
7 or 8 hours of sleep each day, on average ² ..	67	69
9 or more hours of sleep each day, on average ²	9	12

rates could be similar for the sexes, but females take drugs more readily. Higher health services use and higher drug use by females suggest they are more willing to take all kinds of curative action for a discomfort, compared to men.

Preventive Health Behavior

Sex differentials in positive health habits and preventive health care are presented in the following section. Avoidance behaviors (such as not smoking, low alcohol consumption, low caffeine intake) are excluded from this analysis. National data on these behaviors have been reported elsewhere (18,36-39).

The prevention picture is not uniform; the sexes differ in the kinds of measures that they take. National

Table 8 (continued). Preventive health behaviors, by sex
United States (percentages)

Preventive behavior	Males	Females
Preventive examinations		
Ever had examination: ¹		
Electrocardiogram, 40 years and older	65	57
Glaucoma test, 40 years and older	50	57
Chest X-ray, 17 years and older	80	80
Eye examination to determine need for glasses, or change in glasses prescription, 3 years and older	86	90
Routine physical examination (not for illness), under 17 years	86	86
Among those who ever had examination, percent who had it in past year: ²		
Electrocardiogram	42	39
Glaucoma test	36	36
Chest X-ray	40	38
Eye examination	48	46
Routine physical examination	60	56
Had examination during office visit: ^{3,4}		
Limited history or examination	50	52
General history or examination	16	16
X-ray	9	6
Blood pressure check	27	37
Had blood pressure check in past 6 months ⁵ . .	40	54
Had general physical examination while feeling well, in past year ²	37	49
Had blood pressure check in past year ²	74	83
Had eye examination in past year ²	36	39

¹ Study of Health Practices and Opinions, 1969, reference 72. Adults.² National Survey of Personal Health Practices and Consequences, 1979, reference 39. Adults 20-64 years.³ National Health and Nutrition Examination Survey, 1971-75, reference 19. Persons 12-74 years.⁴ National Adult Physical Fitness Survey, 1972. Adults. President's Council on Physical Fitness and Sports: Newsletter, Special Edition, May 1973.⁵ National Health Interview Survey, 1975, reference 18.⁶ National Health Interview Survey, 1973. National Center for Health Statistics, Vital and Health Statistics, Series 13, No. 33.⁷ National Ambulatory Medical Care Survey, 1975. All ages.⁸ May include examination for symptoms.⁹ National Health and Nutrition Examination Survey, 1974. Persons 17-74 years. National Center for Health Statistics, Advance Data, No. 2, Nov. 8, 1976.

surveys indicate that more women than men take vitamins, tonics, and similar products for their health (table 8). A substantially higher percentage of women have followed a weight-reducing diet at least once, and more are currently on such a diet. Recall that in the medical data, a higher percentage of women were classified as obese. More women than men reported that they were overweight (39).

Similar percentages of men and women engage in regular exercise, but men tend to pursue more strenuous sports that give them higher cardiovascular benefits.

Recent data on sleeping and eating habits show few sex differences. Similar percentages of men and women sleep 7-8 hours a night, but more women sleep longer hours. Slightly more than half of each sex eat breakfast regularly. Results of an earlier survey of

Alameda, Calif., residents are reported by Belloc and Breslow (40).

Recently, the National Center for Health Statistics created an index of good health habits (weight control, exercise, sleep, alcohol consumption, and cigarette smoking). Women score higher on this index; 24 percent have five good habits compared to 15 percent of the men (39).

Table 8 also contains data about preventive examinations for early diagnosis of health problems. More men have had an electrocardiogram during their lives. Among people who have ever had electrocardiograms or chest X-rays, more men than women had the examinations recently. Females are more active in obtaining eye examinations for glasses and glaucoma, and they are more likely to have had a recent blood pressure check.

The sexes are equally likely to receive a general examination when they visit a physician, but the females' examinations are more likely to be voluntary and recent (19), partly because they make more total visits per year. Men's examinations are more likely to be required by their employers. Young children are an exception to this pattern: boys have more recent and more voluntary examinations than girls. Apparently young boys receive more preventive care as well as more curative care.

Summary of Sex Differentials in Health

A cursory review of the data suggests that women have greater morbidity than men. After early childhood, females have higher rates of acute conditions and more restricted activity per condition. They are more likely to have a chronic condition. Women have more physician and dentist visits, and they use more drugs. They get less physical exercise than men, and they are less likely to have preventive examinations such as electrocardiograms and chest X-rays for some important chronic conditions.

But men appear to have poorer health in some important respects. They have higher prevalence rates for many chronic conditions related to the leading causes of death, higher prevalence rates of heart disease before age 50, and higher injury rates at all ages. Their chronic conditions are probably more severe. Hospitalization rates are higher for them after about age 50, and hospital stays are longer at most ages. In addition, young boys have poorer health and more health care than young girls.

Explaining Sex Differentials in Health

Why do females have more acute conditions during adult ages and more chronic conditions after age 45?

Why do they have more restricted activity and visits to physicians? I suggest that there are four general reasons for sex differentials in health status and health behavior: inherited risks of illness, acquired risks of illness and injury, illness and prevention orientations, and health reporting behavior. In the next section, I shall discuss how males and females may differ on these factors. Many of the statements are speculative, and more research will be needed to support or refute them.

Inherited risks of illness. The sexes may differ in their inherent vulnerability to disease. Mortality rates are higher for males from the moment of conception. They have higher fetal death rates, infant mortality rates, and death rates from congenital anomalies (41-45). These facts suggest—but do not prove—that some genetic differences in disease vulnerability exist in males and females, and that males are disadvantaged.

In addition, diseases that are specifically linked to the sex chromosomes are more numerous among males than females (46,47). Examples are X-linked ichthyosis, haemophilia, certain types of muscular dystrophy, and red-green color blindness. Research also suggests that boys are more susceptible to infections than girls are (48,49).

Finally, reproductive systems also influence health problems for males and females. It is thought that the hormone estrogen has a protective effect, somehow improving a person's resistance to degenerative diseases (50,51). If so, women enjoy an important advantage until menopause; then estrogen production drops sharply. Nevertheless, pregnancy complications and reproductive disorders increase women's morbidity. There are far fewer possible problems with men's reproductive organs, and men's problems tend to be easier to diagnose and treat. Thus, in the reproductive ages (17-44), females have both an advantage and a disadvantage due to their reproductive biology and roles.

Overall, males may be less durable biologically than females, and male morbidity consequently may be greater than female morbidity. This effect is somewhat offset during women's reproductive years, because of risks associated with pregnancy.

Acquired risks of illness and injury. Males and females are exposed to different physical risks of disease and injury because their work and leisure activities, lifestyles, and (possibly) levels of stress and reactions to stress differ.

First, men are more likely to be employed and to work full-time, and their jobs tend to be more hazardous than women's. Men are therefore exposed to higher risks of occupation-related diseases and injuries. (Full-time housework is not necessarily a safe activity, but it tends to be safer than many jobs outside the home). Men's nonwork activities (leisure, sports, work-related travel) increase their risks of injury compared to women. Sex differences in work and nonwork activities appear early in life; boys' play activities typically pose more injury risks than girls'.

Women's social roles may increase their health risks in one respect. Women tend to have more contact with young children than men do, and so they are more likely to contract infectious diseases, especially acute respiratory ones.

Second, men tend to smoke, drink, and drive more than women. These lifestyle behaviors increase men's risks of chronic conditions such as bronchitis-emphysema, heart diseases, cirrhosis of the liver, and injury.

Third, there is evidence that prolonged stress is related to some chronic illnesses and to injuries. This can occur in two ways: stress may encourage risky lifestyles, or it may directly trigger biochemical processes that cause chronic illnesses. Until recently, researchers thought that men feel more stress than women, because of their heavy economic responsibilities. But some now say that women are more stressed, because of frustrations as homemakers and as employees in unchallenging jobs. In several surveys women reported more stress and anxiety, but some researchers believe this finding is an artifact of the way that questions are worded. Which sex really feels more stressed on a daily or long-term basis is not known for sure.

Another issue is how the sexes react to stress. It is speculated that men cope with stress in two principal ways—by trying to tolerate it silently or by overt behaviors such as drinking more or smoking more. Women may talk to friends more about their troubles, take mood-modifying drugs, and seek medical or psychological help. If so, men's reactions boost their chances of disease and injury, even if the original levels of stress are similar for both sexes. Thoughtful discussions of sex differences in stress levels and stress reactions and of the link between stress and disease have been published (52-55).

Illness and prevention orientations. People vary in their perception of symptoms, assessment of symptoms' severity, and readiness to take curative health actions. These factors can be called illness orientation. People also vary in their readiness to take actions to prevent health problems or to detect asymptomatic ones; this

attitude is called prevention orientation. Both orientations refer to social and psychological factors which influence health perceptions and health behavior. Medical sociologists such as Mechanic (56-58) call illness orientation illness behavior. I use the word "orientation" to emphasize that the factors precede curative actions.

There is widespread belief—and limited evidence—that the sexes differ in their illness orientations:

First, females may be more sensitive to discomfort—more likely to perceive an ailment and also more likely to consider it painful or bothersome. This reaction may have biological origins (such as intrinsic differences to pain sensitivity), but its chief cause is probably social. Boys are taught to ignore symptoms (59), and men traditionally have responsibilities that discourage them from noticing symptoms. Females may not be overtly encouraged to feel ill; they are simply not discouraged as much as males are during childhood and adulthood. (Hypotheses change with the times, and recently some researchers claim that women's usual responsibilities discourage them from noticing symptoms—more so than for men. The essence of the argument is that women have so many tasks—housework, child care, care for ill family members—that they cannot afford to perceive their own symptoms or take care of themselves when ill.)

Second, it may be more socially acceptable for girls and women to report discomforts to family, friends, and professionals. Friends may recommend restricted activity or medical care, helping to legitimate curative actions. During physician visits, women may also report more details about their symptoms, thereby improving the chances of correct diagnosis and appropriate treatment. Wallen and co-workers offer some intriguing evidence on this point (60).

Third, females may be more willing and able to cut down on their usual activities when ill or injured. They may believe that bed rest or other restrictions will speed recovery or prevent a problem from worsening. Also, females' schedules may have more discretionary time periods. And income loss from illness is usually lower for women, since they are less likely to be employed or a family's main income-earner. This situation is changing as more women become household heads, and as more married women have full-time jobs.

Fourth, females may be more willing and able to seek medical and dental help and use medicines to cure them. Surveys of health attitudes show that women have more confidence in physicians and in the efficacy of medicines and treatments (61). Also, if

women do have more discretionary time, they may find it easier to make time for a medical or dental visit or for a hospital stay. One impediment to medical care for women is their poorer health insurance coverage (62,63), which boosts personal costs for health care (24). But other "costs" of illness (such as lost work income) may be less for them.

The sexes may also differ in prevention orientations. Females may be more eager and able than males to take preventive health actions. The reasons are similar to those just cited. More than males, females may believe that preventive actions aid health. And with more discretionary time, they may be able to visit physicians and dentists for preventive examinations more easily than males can. In addition, routine visits for reproductive health care often include tests for chronic problems such as high blood pressure. So women's attentiveness to reproductive health has "spin-off" benefits for other health problems.

Overall, females' illness and prevention orientations act to increase their morbidity rates, compared to males. But why are they more body-sensitive, willing to talk about health problems, and ready to take preventive and curative actions? Two main reasons have been suggested.

First, females are more involved than males in health and health care throughout life. Girls are allowed to voice body discomforts more than boys are, and more attention is given to girls' puberty. Even without such attention, menarche makes a girl keenly aware of her body and her feelings over time. Boys are more likely to move through puberty without radical changes in symptom perception. As adults, women usually become responsible for family members' health—watching for signs of illness, helping them when ill, and making appointments or escorting them to physician and dentist offices (64). To fulfill this role, women become more informed about health and health services. Still another aspect of health socialization has been suggested—that females are taught to define their life problems in physical and personal terms, whereas males focus on the social (external) causes of their problems. If this is true, distressed women are more likely to self-medicate or seek professional help.

Second, more flexible schedules do not necessarily mean that women have more leisure time than men; it simply means they can alter their routines more easily. Similarly, it is not necessarily true that women have fewer role obligations than men. But their obligations may be less time-restricted. Various hypotheses about time constraints and their effect on health behavior have been suggested. I suspect that the crucial feature is flexibility in a schedule rather than the

amount of free time, and that women have greater flexibility than men do; these hypotheses need to be tested.

Health reporting behavior. Health surveys are usually conducted in face-to-face or telephone interviews; occasionally respondents fill out questionnaires. The wording and placement of questions and the way interviewers probe for answers can influence replies. If men and women differ in their reactions to these survey procedures, the data will be affected. For example, if they differ in willingness to report past health events, then rates will be underestimated for the less-willing group. There are three ways that health reporting behavior might affect sex differentials.

First, health socialization may make women better respondents in that they may remember both major and minor health problems and actions better than men do. And they may be more willing to talk about health with an interviewer—simply an extension of their greater willingness to discuss symptoms with friends and professionals. By contrast, men may forget their health problems more quickly, have a sparser health vocabulary, and be less eager to discuss health matters with a stranger. There is very little evidence to support these hypotheses. Researchers have observed that people tend to underreport the number of physician visits, hospitalizations, and diagnosed chronic conditions; but there is no sex difference in the degree of underreporting for these major events (65-67).

Second, proxy respondents tend to underreport illnesses and disability of other household members (68-71). Proxies are usually asked to report for children and for adults not present at the interview. They can be unaware of chronic conditions of other members and of acute conditions that cause no visible disability or medical care, and proxy respondents are more likely to forget others' conditions than their own. Because women often serve as proxy respondents for men (and rarely vice versa), proxy effects tend to reduce male morbidity rates.

Third, interviewers in health surveys are usually women. Female respondents may relate their own health problems to them more readily than males do. Little is known about the effect of same-sex versus opposite-sex pairings of respondent and interviewer (72).

Discussion. The relative importance of the four reasons for sex differentials varies, depending on the kind of data. When the data's sources are medical examinations or laboratory tests of a general population, sex differentials should be most attributable to differences

in inherited and acquired risks. Illness and prevention orientations and health reporting behavior become more important with interview data. For these, a sex differential in reported morbidity partly reflects risks that men and women incur, but it also reflects awareness of the condition and willingness to report it. Social and psychological factors are important in interpreting health behaviors such as restricted activity, limitations, medical care, drug use, and so forth. In sum, intrinsic and acquired risks are important for understanding all types of health data, but the importance of risks (compared with social and psychological factors) declines as we move from medical data to interview data on morbidity, and then to health behavior data.

If one adopts a strictly medical perspective, morbidity rates reflect "real" illness and health behavior rates reflect "needs for care." This view takes only inherited and acquired risks into account, and it can lead to false conclusions. Health interview data—the most common kind of information on a population's health—should always be viewed from a sociomedical perspective, which takes all four factors into account.

Such a perspective is critical for understanding sex differentials in health. A medical view leads to the simplistic conclusion that females are "sicker" than males and that their greater disability, health services use, and drug use are a direct outcome of that. But if the social and psychological factors are taken into account, female morbidity rates may be elevated because of women's illness and prevention orientations and, possibly, their health reporting behavior. Males appear to have higher inherited and acquired risks of illness, and it is likely that morbidity rates are actually higher for them, especially for many chronic conditions. For conditions that do have a female excess (possibly acute conditions and chronic ones such as arthritis), social and psychological factors act to increase the sex differential. And, females' more active health behavior is probably extremely dependent on their reactions to illness and injury.

In a nutshell, inherited and acquired health risks are greater for males, boosting their illness and injury rates relative to females. But females' rates are elevated by their keener symptom perception and by their better recall and willingness to report health problems. Males' poorer physical status increases their disability and needs for medical care. But females' health socialization and time flexibility strongly encourage short-term disability, medical care, and drug use. Thus, females' poorer health profile in surveys is strongly affected by social and psychological factors, which act to offset an underlying physical disadvantage

of males. In the short run, men may appear healthier than women. But in the long run, their disadvantage asserts itself—in higher mortality rates.

The foregoing summary is a set of hypotheses, not demonstrated facts. Other workers have discussed these hypotheses (20,51,73-75).

An additional factor: health behavior as a cause. Health behavior is usually viewed as the result of illness and injury, but it can also influence future morbidity and promote health, too. How can this occur?

First, slowing down when ill may promote long-term health by speeding recuperation from the current problem and possibly improving general resistance to disease. What seems like poor health at one point may therefore bode well for future health. Second, medical care for one problem promotes early diagnosis of others, and it encourages continuous monitoring and therapy for chronic problems. Although choosing a physician and making a first visit may seem arduous, it makes later visits easier. Women are more likely than men to have such familiarity with health services. In addition, physicians recommend followup visits more often for women patients than for men patients (34); the reasons are not fully understood.

In sum, restricted activity and care for current problems may give females a long-term health advantage by ultimately reducing older women's acute incidence rates and chronic prevalence rates and especially the severity of their conditions. Health behavior also spurs other health behaviors, so older women's active use of health services and medicine are partly a continuation of earlier behaviors, reflecting attentiveness to health and familiarity with health services. Older men begin to catch up in restricted activity and medical care as their problems worsen and urge attention.

Comparing Health and Mortality

Throughout this century, females have had a longevity advantage over males. Females' death rates are currently lower than males' at all ages and for all leading causes of death. How is it that "females are sicker, but males die sooner?" The answer is twofold.

First, the reversal—that females live longer but have more morbidity—is partly due to an "aggregation effect." For both acute and chronic conditions, the sex with higher death rates for a particular condition usually has higher morbidity rates too. For life-threatening chronic conditions, males have both higher prevalence rates and higher death rates. (Cancer, the sole exception, was discussed previously.) Similarly, males' injury rates and their accident and homicide mortality rates exceed females'. Females have a higher prevalence

of many chronic conditions, but these are rarely causes of death. Males tend to have higher death rates than females for acute diseases. Up to about age 17, boys show higher acute morbidity, too. But after that age, women have higher rates in interview data and sometimes in medical surveillance data. Epidemiologic data for adults are sparse, so it is difficult to know whether women have higher rates of "real" acute morbidity by medical criteria.

How does this lead to an "aggregation effect"? Conditions that figure importantly in morbidity are not very important in mortality, and vice versa. Acute conditions are the most common causes of illness, disability, and health services use, but they seldom cause death. Highly prevalent chronic conditions (such as arthritis or hemorrhoids) cause frequent and extensive morbidity, but seldom death. By contrast, the chronic conditions likely to cause death are often not so bothersome on a daily basis.

Consequently, when general illness rates are computed, they often show a female excess—because conditions with higher female rates are common and therefore are weighted heavily. By contrast, when general death rates are computed, they show a male excess—because the chronic conditions with higher male rates are weighted heavily. This "aggregation effect" accounts in part for the reversal of sex morbidity versus sex mortality differentials. (76). It reflects the rather low relationship between a condition's prevalence and its mortality risk.

Second, mortality is mainly the outcome of inherited and acquired risks; but morbidity (as measured in surveys) is also strongly affected by social and psychological factors. If females perceive symptoms more readily, take care of themselves more when ill, and willingly discuss their health with others, these actions boost their morbidity rates. The more a morbidity indicator includes such factors, the greater the chance it will show a female excess. It is very likely that the more "discretionary" a symptom or a health behavior is, the more important social and psychological factors are in the reports. For example, health attitudes are probably more involved in perceiving a stomachache than a fracture, and more important for taking cold medication than perceiving the cold itself.)

So the reason for the reversal lies, first, in the weak tie between the prevalence of a condition and mortality from that cause and, second, in how the sexes react differently to their health problems.

Conclusion

Most people hope for a long and healthy life. What happens to them varies greatly by sex: males have

shorter lives than females, and they are probably less healthy while living—from a medical viewpoint. But from a sociomedical viewpoint, females have less healthy lives. They simply do not feel well as often as males do. Clinical epidemiologists might say this obscures the "truth," but social epidemiologists and medical sociologists view it as an important truth in its own right. Poor health causes disruption of work and social activities, involves discomfort and depression, and leads to high health care expenses. Females experience these consequences of illness and injury more than males at all ages, except during early childhood.

There are now ample health data which show sex differentials in health and mortality, but little research has been devoted to explaining those differentials. This situation is being remedied by contemporary researchers, and their results—testing hypotheses stated in this article and others—can be expected in the next few decades.

Principal Data Sources and Definitions

All the health surveys listed are conducted by the National Center for Health Statistics, Department of Health and Human Services. The Census of Population is conducted by the U. S. Bureau of the Census, Department of Commerce.

National Health Interview Survey (NHIS)

The Health Interview Survey has been conducted continuously since 1957. A national sample of households is interviewed about household members' recent illnesses and injuries, chronic conditions, short-term and long-term disability, and health services use. Annual rates are published in Series 10 of Vital and Health Statistics.

National Health Examination Survey (NHES) and National Health and Nutrition Examination Survey (NHANES)

The Health Examination Survey was conducted in the 1960s, in three separate phases for age groups 6-11, 12-17, and 18-79. A national sample of people had a health interview and medical examination. In the 1970s, the survey

was expanded to include information on nutritional status; it was renamed the Health and Nutritional Examination Survey. NHANES covers the population ages 1-74. NHES and NHANES provide data on anthropometric measurements, chronic diseases, food intake and nutritional deficiencies (NHANES only), vision, hearing, dental status, and psychological distress.

National Hospital Discharge Survey (NHDS)

Since 1973, data have been collected annually from non-Federal short-stay hospitals about their patients and facilities.

Resident Places Survey (RPS) and National Nursing Home Survey (NNHS)

The Resident Places Survey covered facilities providing care to the aged and chronically ill in 1963, 1964, and 1969. The survey was redesigned in the 1970s and named the National Nursing Home Survey. The surveys provide information about residents' demographic and health characteristics and about the services provided to them.

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National Ambulatory Medical Care Survey (NAMCS)

Initiated in 1973, NAMCS has been an annual survey of visits to office-based physicians. It provides data on symptoms, medical diagnoses, services ordered or given, and plans for referral or followup. (In the 1980s, it will be conducted less frequently.)

Census of Population (Census)

The Census regularly collects information about institutionalized people (in chronic disease hospitals, homes for the aged and dependent, mental hospitals, and correctional facilities). The 1970 Census had a question about work disability due to poor health. The 1980 Census included items on work disability and on people's ability to use public transportation.

Health Terms and Definitions

Morbidity—any measure of specific conditions or symptoms.

Condition—illness or injury with a medical name (for example, diabetes mellitus).

Acute condition—illness or injury of short duration, typically less than 3 months.

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Chronic condition—illness or injury lasting 3 months or more.

Chronic disease—degenerative illness.

Impairment—long-term or permanent defect, usually static, that has resulted from disease, injury, or congenital malformation.

Symptom—discomfort described in lay terms (for example, runny nose).

General health status—self-rated health (for example, excellent, good, fair, or poor).

Disability—any restriction in activities because of illness, injury, or impairment.

Short-term disability or restricted activity days—days a person cuts down usual activities for all or part of the day because of an acute condition or flareup of a chronic condition.

Bed days—days spent in bed.

Work loss days—days absent from work.

School loss days—days absent from school (usually refers only to children).

Other restricted activity days—days when other activities besides work or school were reduced.

Long-term disability or limitation—

permanent limitation in activity or mobility.

Limitation in social activity—problems in performance of social roles and activities such as employment, school, housework, or sports (examples: cannot hold a paid job; cannot do strenuous sports; limited in type of job).

Limitation in mobility—problems in going from one place to another, in home or outside home (examples: cannot drive a car; uses special aid to get around; confined to wheelchair or bed).

Limitation in physical activity—problems in body movement and personal care activities (examples: cannot lift heavy objects; cannot climb stairs; needs assistance in eating).

Health services use—contact with medical and dental professionals for curative or preventive purposes.

Physician visit—contact with a physician, in person or by telephone (may refer just to medical doctors, or also include nonmedical practitioners such as chiropractors, public health nurses, psychiatric social workers, and so forth).

Dentist visit—visit to a dentist's office

for treatment or advice from a dentist or dental hygienist.

Short-stay hospital—overnight or longer stay in a facility which does not have permanent residents.

Long-term care facility or institution—residence in a facility for ill and disabled people, which has nursing services available.

Lay conversations about health—conversations with family, kin, or friends about symptoms, conditions, or health behaviors.

Drug use—use of pills, medicines, or treatments for curative or preventive purposes.

Preventive health behaviors—actions to prevent illness or injury or to detect disease early while it is asymptomatic.

Positive health habits—overt actions to prevent illness or injury (examples: eating nutritious meals; exercising regularly; wearing seat belts).

Avoidance behaviors—stay away from substances or places that are known or believed to harm health (examples: not smoking, not drinking alcoholic beverages).

Preventive health care—examinations or tests for early detection of disease.

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SYNOPSIS

VERBRUGGE, LOIS M. (University of Michigan): *Sex differentials in health. Public Health Reports*, Vol. 97, September-October 1982, pp. 417-437.

Health status and health behavior of males and females in the United States are compared; the data employed in the analysis are from community studies and the surveys of the National Center for Health Statistics. Females generally show a higher incidence of acute conditions, higher prevalence of minor chronic conditions, more short-term restricted activity, and more use of health services (especially outpatient services) and medicines. By contrast, males have higher prevalence rates for life-threatening chronic conditions, higher incidence of injuries, more long-term disability, and after about age 50, higher rates of hospitalization. These sex differences appear at all ages, except for early childhood

when boys have a worse health profile than girls.

The following interpretations are consistent with the data; they are hypotheses rather than demonstrated facts. Women are more frequently ill than men, but with relatively mild problems. By contrast, men feel ill less often, but their illnesses and injuries are more serious. These morbidity differences help to explain sex differentials in health behavior; frequent symptoms lead to more restricted activity, physician and dentist visits, and drug use for women; severe symptoms lead to more permanent limitations and hospitalization for men.

But attitudes about symptoms, medical care, drugs, and self-care are also extremely important. Males may be socialized to ignore physical discomforts; thus, they are unaware of symptoms that females feel keenly.

Also, men may be less willing and able to seek medical care for perceived symptoms. When diagnosis and treatment are finally obtained, men's conditions are probably more advanced and less amenable to control. Finally, men may be less willing and able to restrict their activities when ill or injured.

Four important factors that underlie sex differentials in health are discussed: inherited risks of illness, acquired risks of illness and injury, illness and prevention orientations, and health reporting behavior.

Statistics show that women ultimately have lower mortality rates than men—despite women's more frequent morbidity and possibly because of more care for their illnesses and injuries. The apparent contradiction between sex differences in morbidity and mortality (females are sicker but males die sooner) is explored.

Tax Expenditures and Health Insurance: Limiting Employer-Paid Premiums

GAIL R. WILENSKY, PhD
AMY K. TAYLOR, PhD

ATTEMPTS TO CONTROL INFLATION in the health care sector, until very recently, have focused on regulation. General dissatisfaction with this approach and with specific regulatory attempts has led to interest in strategies for increasing the awareness of consumers and providers of the costs entailed in using health services. These strategies propose cost-sharing provisions, reducing benefit coverage, and encouraging enrollment in health maintenance organizations (HMOs), which are believed to deliver services more efficiently.

Dr. Wilensky is senior research manager, Division of Intramural Research, and Dr. Taylor is service fellow, Division of Intramural Research, in the National Center for Health Services Research, Public Health Service. Allen Kendall of Social and Scientific Systems, Inc., Washington, D.C., assisted with the programing of the data and Pamela Farley of the National Center for Health Services Research provided analytical assistance. The paper was presented at the annual meeting of the Eastern Economic Association in Washington, D.C., on May 1, 1982. Tearsheet requests to Dr. Gail R. Wilensky, Division of Intramural Research, National Center for Health Services Research, Room 8-50B, 3700 East-West Highway, Hyattsville, Md. 20782.

Since such mechanisms for increasing cost consciousness would operate through the types of health insurance that people purchase, a key to these strategies is to offer a choice among private health insurance options.

One mechanism for influencing consumer purchases of insurance is by way of employer-provided health insurance, since this constitutes the bulk of private health insurance. Recent estimates indicate, for example, that almost 85 percent of private health insurance is employment related (1). Although there are several reasons for this predominance of employment-related health insurance, such as the lower premium rates associated with group insurance, a major factor is that employer contributions to health insurance are excluded from employees' taxable income. Thus, for any given amount spent by employers, employees are provided with more health insurance than they would be able to purchase if they were to use after-tax wages. The value of this tax saving increases with the employee's taxable income and corresponding marginal tax rates. Although it is worth nothing for those with

incomes so low that they owe no income taxes, it is worth 50 percent of the employer contribution for those in the highest tax brackets. The total value of this tax expenditure is large: it was estimated at about \$8 billion in 1977 (2) and perhaps as much as \$20 billion in 1981.

The revenue losses resulting from tax savings by certain groups of taxpayers are greater than just the losses in Federal income tax revenue. Not considering employer-paid insurance premiums as income also reduces the base that is used in calculating social security, or the Federal Insurance Contributions Act (FICA), liabilities, although this results in a tax saving—and thus a revenue loss—only for employees whose wages are below the social security ceiling. A third component of revenue loss is the exclusion of employer contributions from the taxable income underlying State and local income tax liabilities. These three components not only represent large losses of revenue but there is some evidence that they have been growing rapidly. According to a Treasury Department estimate, tax expenditures associated with Federal revenue losses

grew at an annual average rate of 19 percent between 1975 and 1979, which is considerably higher than the rates for Medicare and Medicaid (2).

Although the amounts involved are large, the current tax treatment of employer-provided health insurance is not only a matter of revenue loss. Rather, by effectively reducing the price of insurance, the exclusion of employer-paid insurance premiums from taxable income has encouraged the purchase of more comprehensive insurance coverage, resulting in higher levels of expenditures on health care. While the precise relationship between insurance, health care use, and expenditures has been debated, there is ample evidence that such a relationship exists (3-5).

Placing limits on the amounts of health insurance premiums that employers can provide on a tax-free basis, or taxing all health insurance premiums as ordinary income, has been discussed during the past decade and has been a key element in several legislative proposals. The Durenberger bill (S.433), for example, would place limits on these amounts. The Gephardt-Stockman bill (H.R.850) would allow employees who

choose cheaper plans to receive the difference between high- and low-cost plans as a tax-free rebate, an approach which also effectively removes the incentive for employees to increase the share of their wages that is taken as health insurance rather than as taxable wages, although it is obviously more costly to the Treasury.

In this paper, we examine some of the effects of placing limits on the amounts of health insurance premiums that employers can provide on a tax-free basis. Primarily, we show the numbers and characteristics of people who would be affected, the amounts of additional taxes they would have to pay, changes in the additional taxes relative to income, and the total amounts of revenue at risk under various tax-free limits.

We obtained our data from the 1977 National Medical Care Expenditure Survey (NMCES), which provided detailed national estimates of the use of health services, health expenditures, and health insurance coverage. The survey was undertaken to provide data for a major research effort in the National Center for Health Services Research and was co-sponsored by the National Center for Health Statistics. The sample and design of the surveys and the instruments and procedures are described elsewhere (6-8). The characteristics of subscribers, including income and tax filing status, were derived from the household survey. The data on employer contributions and the presence of employment-related insurance and type of coverage

Table 1. Average employer contribution to health insurance for subscribers by family income, 1977

Family Income	Number of subscribers (in thousands)	Average contribution by employer
Total	¹ 54,090	\$623
\$1-\$9,999	7,236	490
\$10,000-\$19,999	20,598	596
\$20,000-\$29,999	14,640	686
\$30,000-\$39,999	6,335	696
\$40,000 or more	5,202	641

¹ Excludes all subscribers with zero employer contributions.

SOURCE: National Medical Care Expenditure Survey, National Center for Health Services Research, unpublished data.

were derived from employer and insurance carrier reports in the Health Insurance/Employer Survey.

Employer Contributions to Health Insurance

Employer contributions to health insurance premiums in 1977 were estimated to be about \$34 billion for almost 55 million subscribers. The average employer contribution per subscriber was \$623 (table 1). Although this contribution increased with subscriber family income, the highest income class being the exception, the relationship between employer contribution and family income was not strong.

The range of employer contributions to health insurance at each level of subscriber income is shown in

Table 2. Employer insurance contributions for family and individual coverage by family income, in percentages

Family Income	Number of subscribers (In thousands)	Employer insurance contributions						
		\$0	\$1-\$99	\$100-\$299	\$300-\$499	\$500-\$799	\$800-\$1,199	\$1,200 or more
		Family coverage						
Total	141,757	12.0	2.6	11.0	12.2	23.8	26.0	12.5
\$1 to \$9,999	4,946	16.2	4.8	16.0	14.0	20.0	21.3	7.8
\$10,000 to \$19,999	16,176	12.8	2.5	12.1	13.6	23.8	25.7	9.6
\$20,000 to \$29,999	11,693	10.2	1.7	8.7	11.8	24.6	26.7	16.4
\$30,000 to \$39,999	5,006	9.8	2.2	9.6	6.9	26.7	29.3	15.4
\$40,000 or more	3,890	11.7	3.5	9.1	11.7	23.0	26.4	14.8
Individual coverage								
Total	124,089	24.9	5.5	31.8	24.3	9.3	2.9	1.3
\$1 to \$9,999	6,933	36.0	4.7	30.2	19.9	5.8	2.3	1.0
\$10,000 to \$19,999	8,050	21.5	6.8	31.5	25.8	10.5	2.8	0.9
\$20,000 to \$29,999	4,734	18.4	5.9	32.4	26.0	13.1	2.8	1.4
\$30,000 to \$39,999	2,101	17.9	4.5	32.3	30.4	7.2	5.2	2.6
\$40,000 or more	2,148	22.7	2.6	36.6	23.5	9.6	2.4	2.6

¹ Components do not add to total because subscribers with income less than \$1 have been excluded.

SOURCE: National Medical Care Expenditure Survey, National Center for Health Services Research, unpublished data.

table 2 by family and individual coverage. These distributions are shown separately because legislative proposals to limit employer contributions place different limits on individual coverage and family coverage policies.

The total number of subscribers to employment-related insurance was 65 million, 41.8 million with family coverage and 24 million with individual coverage. (Of these 65 million, about 11 million reported zero—less than \$1—employer contributions. The number seems unreasonably high. An analysis of the employment status, total premium expenditures, and other characteristics of the 11 million indicated that a small number were retired, most worked full year, and almost all had very low total premium expenditures. The insurance status of some of these people may have been reported erroneously by their employers or carriers as being employment related. Since these cases are not affected by any limitations on employer contributions, however, any possible misclassification does not affect the subsequent analysis.)

More than half of the subscribers with family coverage had employer contributions greater than \$500 in 1977, and almost 40 percent had employer contributions greater than \$800. From table 2, it is also clear that the correlation between family income and employer contributions to insurance would be low. Although there was a slight tendency in the lower income groups to have higher percentages of subscribers with less than \$300 in employer contributions and for the higher income groups to have a higher percentage of subscribers in the \$1,200 or more category, 50 percent of family subscribers had contributions between \$500 and \$1,200. There was essentially no variation according to income.

Among subscribers with individual coverage, two-thirds had contributions of less than \$300. Excluding the large number with zero contributions, about half had contributions of more than \$300. Low-income subscribers with individual coverage also tended to be somewhat clustered at the lower end of employer contributions, while higher income subscribers tended to be at the high end of employer contributions, but the relationship is obviously not strong.

To determine why some low-income subscribers have high employer contributions (above \$800 for family coverage), their employment status, retirement status, and the inclusion of negative income components were analyzed. In general, most of these subscribers worked all year and almost none had negative components of income. Negative income was considered because of the concern that some of these subscribers were only temporarily in the low-income class because of capital or

other types of property income losses. Instead, it appears that these persons were primarily low-wage workers in high-benefit industries, for example, entry level Federal Government workers, or low-wage workers in manufacturing industries, rather than part-year workers or those affected by income losses in 1977.

Effect of the Current Exclusion

The effect of the current exclusion of employer contributions from taxable income depends on the employee's taxable income—higher incomes are associated with higher tax rates, and higher marginal tax rates produce greater tax savings. Of the 54.1 million subscribers with employer contributions, all received tax savings from the exclusion. Most received savings from Federal or State income taxes, or both, and a small number of lower income subscribers received savings from social security taxes. The average saving in Federal income tax for those who received any type of tax savings in 1977 was \$157 (this average excluded families without any Federal or State tax liability). This saving varied substantially by income: subscribers with a family income less than \$10,000 saved an average of \$60 per family, and subscribers with a family income of more than \$40,000 saved an average of \$265. With regard to all three types of tax savings, the average was \$206; families with less than \$10,000 income received an average saving of \$97, and those with income greater than \$40,000 received an average saving of \$315.

Limits on Tax-Free Employer Contributions

Four hypothetical plans with different ceilings on tax-free employer contributions to health insurance premiums were analyzed. These ceilings are based on legislative proposals currently before Congress. Because the NMCES data represent the population in 1977, limits were chosen that are equivalent to those discussed for enactment in 1983. In the first plan analyzed, all employer contributions to health plans would be fully taxable. Plan 2 would place a tax-free ceiling of \$500 per year on family plans and \$200 per year on individual plans, equivalent to \$1,125 and \$450, respectively, in 1983. Under plan 3, tax-free employer contributions would be limited to \$805 for family coverage and \$320 for individual coverage, or \$1,800 and \$720 in 1983 dollars. The limitations for plan 4 would be \$1,075 and \$430, equivalent to \$2,400 and \$975 in 1983.

Tables 3 and 4 present a summary of the impact of imposing these limits on tax-free employer contributions to employment-related health benefit plans. The number of subscribers affected and average tax in-

Table 3. Number of subscribers who would be affected and average tax liability for four hypothetical plans with specified limitations on tax-free employer contributions to health insurance, 1977

Plan for tax status of insurance premium	Number of subscribers affected (in thousands)	Average Increase In—			
		Federal income taxes ¹	FICA ¹	State income taxes ¹	All taxes
Plan 1: No exemption	54,090	\$157	\$22	\$27	\$206
Plan 2: \$500 for family, \$200 for individual policies exemption	41,250	91	13	16	120
Plan 3: \$805 for family, \$320 for individual policies exemption	25,805	71	10	13	93
Plan 4: \$1,075 for family, \$430 for individual policies exemption	13,675	65	8	12	86

¹ Excludes subscribers not affected by any tax changes.

SOURCE: National Medical Care Expenditure Survey, National Center for

Health Services Research, unpublished 1977 data.

NOTE: FICA is the Federal Insurance Contributions Act.

creases are given in table 3, and table 4 shows the total tax revenues that would be raised by each of these plans.

As expected, plan 1, which would treat all employer contributions for health insurance premiums as taxable income, results in the largest increase in taxes (by \$206 per subscriber) and would affect more than 54 million people, or 82 percent of all subscribers with employment-related health insurance. For each subscriber so affected, Federal income taxes would be raised by \$157 on average, the employee's share of social security (FICA) taxes by \$22, and State taxes by \$27. If there were a limit of \$500 on tax-free employer contributions for family coverage, the number of affected subscribers would be reduced to 41 million, or 63 percent of all those with employment-related health insurance. The average total tax increase per affected subscriber would be much smaller than in plan 1—only \$120. Under plans 3 and 4 (with family limits of \$805 and \$1,075, respectively), tax increases would be reduced still further. Although the average tax increase for these two plans is quite similar, nearly twice as many subscribers would be affected by plan 3 as by plan 4. The implica-

tions of these average figures for aggregate revenue increases are shown in table 4.

Based on data for 1977, the total tax increases under the proposed changes in the tax treatment of employer-provided health insurance range from \$1.2 to \$11.1 billion. These amounts are equivalent to \$3.5 to \$32 billion in 1983. Roughly 75 percent of these amounts are due to increases in Federal income taxes, and the remainder are almost equally divided between employee contributions to social security and State income taxes.

Again, plans 3 and 4, with relatively high limits on tax-free benefits, on average would affect large numbers of subscribers but not produce large aggregate tax increases (for both plans, an average of 36 percent of subscribers but only 16 percent of revenues projected under plan 1). For example, an \$800 limit in 1977 would have affected 25 million people but raised only \$2.4 billion in tax revenues. In contrast, taxing employer contributions to health insurance in full would affect twice as many subscribers, but tax revenues would be more than four times as high, or \$11.1 billion. An intermediate limit, such as \$500 for family

Table 4. Number of subscribers who would be affected and total increases in taxes for four hypothetical plans with specified limitations on tax-free employer contributions to health insurance, 1977

Plan for tax status of insurance premium	Number of subscribers affected (in thousands)	Total Increase (in millions) In—			
		Federal income taxes	FICA	State income taxes	All taxes
Plan 1: No exemptions	54,090	\$8,492	\$1,205	\$1,452	\$11,150
Plan 2: \$500 for family, \$200 for individual policies exemption	41,250	3,769	519	655	4,943
Plan 3: \$805 for family, \$320 for individual policies exemption	25,805	1,834	245	324	2,403
Plan 4: \$1,075 for family, \$430 for individual policies exemption	13,675	894	115	161	1,170

SOURCE: National Medical Care Expenditure Survey, National Center for Health Services Research, unpublished data.

NOTE: FICA is the Federal Insurance Contributions Act.

coverage, would affect almost as many people (41 million) but raise less than half of the taxes (\$4.9 billion).

Table 5 shows for each of the plans the number of subscribers affected, the average increase in Federal income tax, the average increase in total tax, and the tax increase as a proportion of income by family income class. In each case, the percentage of subscribers affected is lowest for the under \$10,000 class because (a) a higher percentage in this category report zero employer contributions, which means that they would be unaffected by these limitations, and (b) a higher percentage have no tax liability as a result of their low income. The peaks at the \$30,000 to \$40,000 level in all plans are the result of high employer contributions (table 2).

Although the average increase in Federal income tax liability for those affected varies substantially—from

\$157 in plan 1 to \$65 in plan 4—the variation across income groups is even greater. In plans 1 to 3, the average Federal income tax increase for the highest income group is about four times as large as the increase for the lowest group; in plan 4, it is about three times as large.

Because FICA is a regressive tax and State income taxes tend to be proportional or only slightly progressive, the average increase in total tax shows less variation. In plans 1 to 3, for the highest income group, the average increase is about three times that of the lowest group, and about 2.5 times in the case of plan 4. That this rise in the total tax, while still substantial, is less than the increase in income itself is evident when the increase in tax is shown as a proportion of family income, which falls as family income increases; the largest drop here is between incomes under \$10,000

Table 5. Number of subscribers who would be affected and the average increased tax liability for four hypothetical plans with specified limitations on tax-free employer contributions to health insurance, 1977

with specified limitations on tax-free employer contributions						
Family income	Number of subscribers (in thousands)	Subscribers affected		Average increase in—		Increased total tax as a proportion of family income ¹
		Number	Percent	Federal income tax ¹	Total tax ¹	
Plan 1. No tax free limitation						
Total	65,847	54,090	82	\$157	\$206	0.0106
\$1-\$9,999	11,879	7,236	61	60	97	0.0154
\$10,000-\$19,999	24,226	20,598	85	126	176	0.0118
\$20,000-\$29,999	16,427	14,640	89	183	237	0.0098
\$30,000-\$39,999	7,107	6,335	89	222	270	0.0080
\$40,000 or more	6,039	5,202	86	265	315	0.0054
Plan 2. Tax free limitation—\$500 family, \$200 individual						
Total	65,847	41,250	63	\$91	\$120	0.0059
\$1-\$9,999	11,879	4,813	41	36	57	0.0091
\$10,000-\$19,999	24,226	15,225	63	71	99	0.0066
\$20,000-\$29,999	16,427	11,729	71	105	136	0.0056
\$30,000-\$39,999	7,107	5,362	75	125	152	0.0045
\$40,000 or more	6,039	4,006	66	155	185	0.0032
Plan 3. Tax free limitation—\$805 family, \$320 individual						
Total	65,847	25,805	39	\$71	\$93	0.0045
\$1-\$9,999	11,879	2,825	24	29	47	0.0072
\$10,000-\$19,999	24,226	9,163	38	53	74	0.0049
\$20,000-\$29,999	16,427	7,671	47	80	104	0.0043
\$30,000-\$39,999	7,107	3,525	50	96	118	0.0035
\$40,000 or more	6,039	2,581	43	121	146	0.0025
Plan 4. Tax free limitation—\$1,075 family, \$430 individual						
Total	65,847	13,675	21	\$65	\$86	0.0041
\$1-\$9,999	11,879	1,332	11	32	52	0.0080
\$10,000-\$19,999	24,226	4,337	18	51	71	0.0047
\$20,000-\$29,999	16,427	4,383	27	69	89	0.0037
\$30,000-\$39,999	7,107	2,045	29	85	104	0.0031
\$40,000 or more	6,039	1,552	26	99	121	0.0020

¹ Excludes subscribers not affected by any tax changes.

SOURCE: National Medical Care Expenditure Survey, National Center for Health Services Research, unpublished data.

and those between \$10,000 and \$20,000. As noted before, the percentage of subscribers affected in the lowest income class is substantially less than in other income groups, but for those affected, the increase would represent a larger proportion of their income.

Conclusions

Concern regarding the current tax treatment of employer contributions to health benefits has been twofold. First, this tax treatment has resulted in large revenue losses to the U.S. Treasury and, to a lesser extent, to State governments. Second and more important, the reduced price of health insurance has provided an incentive to purchase excessive amounts of health insurance, a trend which is thought to result in increased levels of health expenditures. Because of these concerns, several legislative proposals to eliminate or limit the current tax exclusion of employer contributions to employee health insurance have been introduced.

In 1977, about \$34 billion in employer contributions went to about 55 million subscribers with employment-related insurance. The average employer contribution of \$623 for those with any contribution tended to increase with the subscriber's family income, although this relationship was not strong. Under current exclusion principles, all of these 55 million subscribers received some tax savings—most from Federal or State income taxes and some from lower FICA taxes. The average Federal income tax savings for those with any type of savings was \$157, ranging from an average of \$60 for those with incomes under \$10,000 to \$265 for those with incomes of more than \$40,000. For all types of taxes, the average saving was \$206 (range \$90 to \$305).

Four limitations on tax benefits were considered, ranging from taxing all employer contributions to taxing the 25 percent of subscribers with the highest contribution. The number of subscribers affected ranged from 82 percent (or all subscribers with employer contributions) to 21 percent; the total tax increases that would have occurred in 1977 ranged from \$11.1 to \$1.2 billion. These amounts are equivalent to \$32 billion and \$3.5 billion for 1983 (exclusive of the employer's share of FICA).

Although the average increases in potential taxes varied substantially across plans, they varied even more across income groups. For Federal income tax, the average increase for those affected was about four times larger for the highest than for the lowest income class—when all tax increases were considered, the differential was about three times. Substantially fewer subscribers with incomes less than \$10,000 were affected, but it should be noted that for those affected,

the tax increase represented a somewhat larger proportion of their income than for the higher income groups.

The four plans considered had different effects in terms of the revenue at risk and the number of subscribers affected. If the purpose is to raise revenue, all or almost all employer contributions must be taxed. However, if the purpose is to promote cost consciousness in the purchase of insurance plans, higher caps (\$1,800 for family coverage in 1983), which would affect a substantial number of subscribers without causing large increases in their tax burden, would be appropriate.

A related question is that of the immediate compared to the long-run effects of limiting the amounts of health insurance that employers can provide to their employees on a tax-free basis. We have described the immediate effects, that is, before affected employees have had an opportunity to respond to the changes in tax treatment. It is expected that limiting the exclusion will lead eventually to less first-dollar coverage and thus to lower medical care expenditures, but to respond to new incentives in the short run, subscribers must have options. Recent evidence from the NMCS (1) indicates, however, that fewer than 20 percent of subscribers with employment-related health insurance had more than one option. Lack of options will not affect the increase in revenues but implies that many subscribers would have difficulty in responding quickly to changes in the tax treatment of health benefits.

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Hospital Location as a Determinant of Emergency Room Utilization Patterns

PAUL K. JONES, PhD
SUSAN L. JONES, RN, PhD
LURA YODER, RN, MSN

ALTHOUGH EMERGENCY ROOM USE has grown dramatically since World War II, the exact reason for this growth is not clear (1). It is common knowledge that the utilization patterns of emergency room (E.R.) patients have changed over the years (2-4). Again, however, the exact nature of this change is not well defined. For example, the literature generally shows that patients with psychiatric conditions (5-10) and those with nonurgent conditions (11-13) have contributed greatly to the rise in emergency room use. However, the possible relationship between the psychiatric status of a patient and the degree of urgency of the patient's case has not been examined (14). Nor has this possible relationship been examined in hospitals at different locations, although patients' E.R. utilization patterns vary by hospital location (15-17). Nearly all the information collected about emergency room use has been from individual hospitals and has resulted from analysis of the emergency services of a single hospital. Few studies have involved the E.R. populations of several hospitals, so that direct comparisons between emergency room utilization at different locations have seldom been possible.

We therefore undertook an examination of the demographic characteristics and utilization patterns of patients in three E.R. populations at different locations. The psychiatric versus nonpsychiatric status of the patients and the degree of urgency of their E.R. visits were examined in relation to each hospital's location. Two specific questions were addressed: How are the

demographic characteristics and utilization patterns of E.R. patients associated with a hospital's location? To what extent are the degree of urgency of the patient's case and the patient's psychiatric status and E.R. utilization pattern associated with the hospital's location?

Methods

Hospital settings. The three hospitals studied are within a 50-mile radius of each other. They were chosen based on census tract information showing that they are located in three diverse socioeconomic areas. One hospital is in an urban area, a second is in a residential area, and a third is in a downtown area.

The urban hospital is a 500-bed, private, acute care, nonprofit institution located in an area of low SES (socioeconomic status) with a population of 2 million. This hospital has an inpatient psychiatric unit and is the institution through which indigent patients are admitted to two State hospitals located in the city. It is also a receiving unit for an Emergency Medical Service. Adjacent to its emergency room is an outpatient clinic, open from 9 am to 5 pm, to which patients are admitted by appointment only. During 1979, approximately 30,000 patients were treated in the emergency room.

The residential hospital is a 700-bed, private, acute care, nonprofit facility located in a middle SES residential area of a smaller industrial city of 220,000 population. It has an inpatient psychiatric unit and maintains a large paramedic program. An outpatient clinic, which is open during the daytime and admits patients by appointment only, is located nearby. A unique aspect of this hospital is that several smaller hospitals in the surrounding area refer their emergency cases to its emergency room. Further, this hospital

Dr. Paul K. Jones is an associate professor, department of biometry, Case Western Reserve University School of Medicine, Wearn Research Bldg., Cleveland, Ohio 44106. Dr. Susan L. Jones is a professor, and Ms. Yoder is an assistant professor, School of Nursing, Kent State University, Kent, Ohio. The study described was supported by National Institute of Mental Health grant No. T15 MH15 831. Tearsheet request to Dr. Paul K. Jones.

serves a wide geographic area (partly rural) with its ambulance service. Approximately 47,000 patients were treated in its emergency room in 1979.

The downtown hospital is a 55-bed, private, acute care, nonprofit institution located in an industrial area with a population of 675,000. Like the other two hospitals, this institution has an inpatient psychiatric unit and a large paramedic program in which paramedics are trained in the hospital emergency room. A telephone number that can be called for paramedic service is frequently aired on various radio stations. A unique aspect of this hospital is that a pediatric facility is one block away. Approximately 3,000 patients were treated in its emergency room in 1979. As in the case of the other two hospitals, an outpatient clinic is located nearby, which is open in the daytime and admits patients by appointment only.

In each of the three hospitals, the staffing patterns for physicians and nurses are similar. All three hospitals have a full-time E.R. medical director, and all supplement physician coverage of the emergency room by hiring moonlighting physicians. The staffing patterns of the nursing personnel at the three hospitals differ in that at the urban hospital all direct patient care is given by a registered nurse, since no licensed practical nurses or paramedics are employed, whereas both licensed practical nurses and paramedics provide direct care in the residential hospital and the downtown hospital.

Data collection. Data for the study were collected by several methods. Under a National Institute of Mental Health grant, two of us (S. L. J. and L. Y.) each spent approximately 1 or 2 days per week over a 10-month period in one of the three emergency rooms. Thus, our personal observations and conversations with the patients and staff, as well as the patients' own observations, were important data sources. Also, the hospitals' records were a source of quantitative data.

By systematically drawing 240 patients' records from each of the three hospitals, we obtained a total sample of 720 records of E.R. visits for examination. This sample size permitted estimation of the differences in the percentages of patients possessing any given characteristics with a standard error not exceeding about 2 percent.

At all three hospitals, E.R. records were filed separately from inpatient records and stored alphabetically within a time period. Inpatient records also were available if the patient had been admitted for inpatient service. Since at times the inpatient record was used to obtain additional information about the inpatient stay, one question asked each patient upon admission to

the E.R. room was whether or not he or she had been admitted to the hospital as an inpatient.

To arrive at a systematic sample of E.R. visits, the available records at each hospital were divided into 26 subsets (1 subset per alphabet letter), and a table of random numbers was then used in conjunction with the local telephone directory to determine the number of records to sample from each alphabet subset. Using a random start, we obtained a systematic sample within each subset. From each E.R. patient's records, the presenting problem, demographic information, and the pattern of emergency room use were then recorded.

Classification system. Based upon examination of each record, two raters who were familiar with the way the emergency rooms operated coded independently each patient visit on two variables: (a) the degree of urgency of patient's condition and (b) whether the patient could be considered to need psychiatric intervention, and if so, what type of deviant behavior was manifested. Those patient records that could not be coded as clearly representing a psychiatric or a nonpsychiatric case were coded as "questionable." All information was recorded on a standard form so that the data for the three hospitals could be standardized.

The criteria of Lavenhar and associates (18) were used to describe the degree of a patient's case. Their definitions of emergent, urgent, or nonurgent are as follows:

Emergent: Condition requires immediate medical attention; time delay is harmful to patient; disorder is acute and potentially threatening to life or function.

Urgent: Condition requires medical attention within a few hours; there is possible danger to the patient if medically unattended; disorder is acute but not necessarily severe.

Nonurgent: Condition does not require the resources of an emergency service; referral for routine medical care may or may not be needed; disorder is nonacute or minor in severity.

Classification of a patient's visit as psychiatric or nonpsychiatric was more difficult than classifying it on the basis of urgency. The presenting behaviors of psychiatric patients are so widely distributed among diagnostic categories that a diagnosis per se may have little relevance to the patient's behavior. We found the traditional psychiatric classifications (19-21) to be inadequate.

The three classifications of deviant behavior we used to describe the patients who came to each of the three hospitals' emergency rooms in need of "psychiatric intervention" are based both upon S.L.J.'s work and observations in the three emergency rooms and

Table 1. Percentage distribution of demographic characteristics and type of payment of patients visiting three emergency facilities

Patients' demographic characteristics and type of payment ¹	Urban hospital—low SES (N = 240)	Residential hospital—middle SES (N = 240)	Downtown hospital—industrial setting (N = 240)
Age (years):			
1-20	35	44	10
21-40	37	35	55
41-60	20	13	22
61 and older	8	8	13
Race:			
White	22	90	77
Black	78	10	23
Sex:			
Male	42	57	47
Female	58	43	53
Marital status:			
Single	59	54	33
Married	25	35	49
Widowed or divorced ..	16	11	18
Type of payment:			
Insurance	36	72	70
Welfare	41	12	14
Medicare	7	5	10
Self-pay	16	11	6

¹ Chi square test of the association between the hospital and its patients' demographic characteristics $P < 0.01$.

upon her conversations with E.R. personnel. In this classification system, which is described in more detail elsewhere (9), the three classes of deviant behavior are exemplified by:

1. The patient who is a victim of assault, such as child abuse, husband abuse, wife abuse, rape, or a gunshot or knife wound.
2. The patient who manifests psychosomatic symptoms, such as tension, nervousness, anxiety, or headache.
3. The patient who manifests bizarre behavior. The etiology of this behavior may be psychiatric illness, the influence of either alcohol or drugs, or a temporary crisis.

A basic assumption in this classification system is that not every patient in need of some type of psychiatric intervention is necessarily mentally ill. Patients experiencing a crisis, for example, may need only temporary external assistance to supplement their internal resources. The point is that at the time the patient comes to the emergency room that patient is considered to be in need of psychiatric intervention.

We had to code a number of the patient records as questionable because the patient's condition could not be clearly described as psychiatric or nonpsychiatric. The following record of an E.R. visit is an example.

A 17-year-old black, single mother brought in her 4-month-old son, stating he was not breathing well. The small child was in no obvious distress. When asked how long the child had experienced difficulty breathing, the mother responded, "Ever since he was born." The child was examined and no symptoms found. The mother and child were sent home with instructions for follow-up care in the clinic.

Based upon clinical observations in the emergency room, we speculated that this mother lacked confidence in her childrearing skills, had no family physician, and needed reassurance that her child was healthy. Thus, she made the E.R. visit out of extreme anxiety and the need for emotional support.

Following is an excerpt from the record of another patient whose psychiatric status could not be determined and whose record was therefore coded as questionable.

A father brought in his 6-year-old son, who reportedly has fallen while playing with a neighbor. The child has a fractured right arm. The child had been brought in 2 months earlier for a severe burn on the left side of his face.

A note had been made in the record that the child was very subdued during the emergency room visit and that there was a cluster of bruises on his buttocks; the possibility of child abuse was mentioned.

For each classification of coding described, an inter-rater reliability was assessed as the percentage of agreement between the two independent coders. Their agreement as to which records should be coded psychiatric versus nonpsychiatric versus questionable was 94 percent; as to the kind of deviant behavior, 96 percent; and as to the degree of urgency, 94 percent. Those patient records about which the raters disagreed were discussed and subsequently placed in one category or another by mutual agreement.

Results

Demographic status by hospital. Patients within each hospital were stratified by age, race, sex, marital status, and method of payment (table 1). The percentage for each stratum was based on the total patients served in each emergency room (240). Patients in the three emergency rooms differed on each of the stratified variables ($P < 0.01$ by the chi square test of association). Although an exact comparison was not possible, it appeared that based upon census tract data for each stratified area, differences in the distribution of patient characteristics at each hospital reflected differences in the locations of the hospitals. Thus, each hospital's E.R. patient population seemingly reflected the locale in which the hospital was situated.

Patients in the downtown hospital were more likely to be older, patients in the urban hospital were more likely to be black, and patients in the residential hos-

Table 2. Cumulative percentage distribution of lengths of stay of patients visiting three emergency facilities, by urgency of visit

Upper limits on length of stay (hours)	Urban hospital—low SES		Residential hospital—middle SES		Downtown hospital—Industrial setting	
	Emergent or urgent (N=160)	Nonurgent (N=69)	Emergent or urgent (N=218)	Nonurgent (N=11)	Emergent or urgent (N=215)	Nonurgent (N=25)
0.5	4	9	11	18	1	8
1.0	21	28	24	36	13	28
1.5	35	41	42	55	22	36
2.0	50	55	57	64	34	44
3.0	63	65	72	64	53	64
4.0	71	71	76	64	68	72
6.0	76	75	78	64	73	80

pital were more likely to be male. The differences in the marital status of patients in the three hospitals reflect the differing ages of their patients. In the downtown hospital, patients were likely to be older and also were more likely to be married, widowed, or divorced than were patients in the other two hospitals. Patients of the urban hospital differed from those of the other two hospitals in that they were less likely to have insurance and more likely to be receiving welfare payments. The urban hospital's patients were also more likely to be self-paying—an indication of a lack of insurance or of welfare payments.

Urgency and psychiatric status. The following table shows the percentage distribution of emergency visits within each hospital according to the degree of urgency ($P < 0.01$ by the chi-square test of association between hospital and degree of urgency).

Percent of total emergency room visits

	Urban hospital, low SES (N=240)	Residential hospital, middle SES (N=240)	Downtown hospital, industrial area (N=240)
Psychiatric status			
Emergent	3	3	4
Urgent	67	92	86
Nonurgent	30	5	10

Approximately the same percentage of E.R. visits at each hospital were classified as emergent. However, the patient population of the urban hospital's emergency room differed from that of the other two hospitals in that a greater percentage of its visits were classified as nonurgent ($P < 0.01$, $df = 4$, by the chi-square test of association). Conversely, a greater percentage of E.R. visits at the residential hospital and the downtown hospital were coded urgent. We (S. L. J. and L. Y.) observed that in general, the kinds of patients with emergent, urgent, and nonurgent visits were

similar in all three hospitals with one major exception. In the urban hospital, a greater number of the emergent or urgent visits involved violence such as rape, a gunshot wound, or a stab wound. This observation lends further support to the conclusion that the patient population of a hospital reflects its locale.

As the following table shows, the psychiatric status of patients making E.R. visits to the three hospitals also differed ($P < 0.01$, $df = 4$, by the chi square test of association). Again, the urban hospital was unique in that a larger percentage of its E.R. visits were classified as psychiatric than at the other two hospitals. Approximately the same number of visits at each hospital were classified as questionable in terms of psychiatric status. The chi square test of association between the hospital and psychiatric status was $P < 0.01$.

Percent of total emergency room visits

	Urban hospital, low SES (N=240)	Residential hospital, middle SES (N=240)	Downtown hospital, industrial area (N=240)
Degree of urgency			
Psychiatric	25	14	16
Nonpsychiatric	37	56	49
Questionable	38	30	35

Emergency room utilization patterns. Patients at the urban hospital were least likely, and patients at the residential hospital were most likely, to have had a previous E.R. visit ($P < 0.05$, $df = 2$, by the chi square test of association). The following table shows, by hospital, the differing circumstances of the patients' current E.R. visits, as well as the differing proportions of these patients who had previously visited the emergency room.

Percent of total emergency room visits

	Urban hospital, low SES (N=240)	Residential hospital, middle SES (N=240)	Downtown hospital, industrial area (N=240)
Patient's utilization pattern			
Had previous E.R. visit ...	26	36	2
Circumstances of current E.R. visit:			
Brought by ambulance ¹ .	9	10	15
Brought by police ²	11	5	4
Admitted to hospital ³ . . .	10	3	17
Has family physician ⁴ . . .	37	80	72

¹ Chi square test of association between the hospital and the utilization pattern $P < 0.05$.

² Chi square test of association between the hospital and the utilization pattern $P < 0.01$.

On the current visit, patients at the downtown hospital were most likely to have been brought to the E.R. room by ambulance and least likely to have been brought in by police. Conversely, patients at the urban

Table 3. Cumulative percentage distribution of lengths of stay of patients visiting three emergency facilities, by psychiatric stress

Upper limits on length of stay (hours)	Urban hospital (low SES)			Residential hospital (middle SES)			Downtown hospital (industrial area)		
	Psychiatric (N = 55)	Nonpsychiatric (N = 95)	Questionable (N = 89)	Psychiatric (N = 31)	Nonpsychiatric (N = 128)	Questionable (N = 70)	Psychiatric (N = 38)	Nonpsychiatric (N = 118)	Questionable (N = 84)
0.5	5	4	8	13	12	9	11	0	0
1.0	24	16	28	23	25	24	24	14	10
1.5	36	31	43	39	44	41	29	27	17
2.0	53	45	57	52	63	51	39	40	26
3.0	60	59	71	65	77	66	58	56	49
4.0	71	67	74	65	81	70	79	70	62
6.0	78	72	79	65	82	81	84	75	69

hospital were least likely to have been brought in by ambulance and most likely to have been brought in by police. Also, at the downtown hospital, patients were most likely to have been admitted as inpatients. The fact that only a few patients at the urban hospital had a family physician reflects this population's lower financial status. In contrast, most of the patients at the residential hospital and three-fourths of those at the downtown hospital had a family physician ($P < 0.05$ or $P < 0.001$ by the chi square test of association).

Whenever patients had indicated that they had a family physician, the physician's name was recorded. It could thus be observed that most of the physicians at the urban hospital whom patients identified were staff physicians at the nearby clinic. In contrast, at the other two hospitals, a sizable proportion of the physicians whom the patients identified were staff members of the hospital. Such a result is significant, since observation at the residential hospital showed that a number of the E.R. visits there could be considered encounters with private physicians. That is, the patient called the private physician when he or she was in distress, and the physician would respond, "Go to the emergency room; I'll meet you there."

Table 2 shows the length of patients' stays in the emergency room in each hospital by the degree of

urgency of the visit. At the urban hospital, 4 percent of the patients whose visits were classified as emergent or urgent were discharged within a half hour or less. Within an hour, 21 emergent or urgent patients and 28 percent of the nonurgent were discharged. Although at each hospital there was a trend for nonurgent patients to be discharged in less time than emergent or urgent patients, this trend was not statistically significant by the Mann Whitney Wilcoxon test (22).

Table 3 shows the length of stays in each emergency room by the patient's psychiatric status—psychiatric, nonpsychiatric, or questionable. Since the lengths of stay of patients whose status was classified as psychiatric, nonpsychiatric, and questionable were similar, the patient's psychiatric status did not appear to be associated with the length of stay.

Table 4 shows that during each 4-hour period of the day, the percentage of patients admitted to the emergency room with urgent or emergent cases was similar at all three hospitals. Thus, the percentage of patients with visits coded as emergent or urgent did not differ by the time of the patients' E.R. admissions.

Table 5 shows the percentage of patients classified as psychiatric in relation to the time of their admission to the three emergency rooms. A consistent pattern of admission of a greater percentage of psychiatric pa-

Table 4. Number and percent of patients admitted to three emergency facilities at various times of day whose visits were classified as urgent or emergent

Time of day of admission	Urban hospital (low SES)		Residential hospital (middle SES)		Downtown hospital (industrial area)	
	Number	Percent	Number	Percent	Number	Percent
1-4:59 am	19	74	24	92	19	79
5-8:59 am	27	63	12	100	22	77
9 am-12:59 pm	44	55	47	91	57	93
1-4:59 pm	59	64	44	100	54	87
5-8:59 pm	54	83	44	95	37	89
9 pm-12:59 am	37	70	67	94	51	98
Total	240	70	238	95	240	90

Table 5. Number and percent of patients admitted to three emergency facilities at various times of day whose visits were classified as psychiatric

Time of day of admission to emergency room	Urban hospital (low SES)		Residential hospital (middle SES)		Downtown hospital (Industrial area)	
	Number	Percent	Number	Percent	Number	Percent
1-4:59 am	19	42	24	13	19	25
5-8:59 am	27	37	12	25	22	23
9 am-12:59 pm	44	18	47	17	57	9
1-4:59 pm	59	19	44	11	54	9
5-8:59 pm	54	28	44	9	37	22
9 pm-12:59 am	37	22	67	15	51	20
Total	240	25	238	14	240	16

NOTE: Chi square test of association between percentage of psychiatric patients and time of admission $P < 0.01$.

tients at night could be observed at all three hospitals. At each hospital, more psychiatric patients were admitted to the emergency room between 9 pm and 9 am than between 9 am and 9 pm ($P < 0.01$, $df = 1$, by the chi square test of association).

Discussion

Although utilization patterns in the emergency room have been described in a great deal of the literature over the past several years, many study results are conflicting and even contradictory (16). For example, it was found that at one hospital the greatest volume of patients came in during the evening or on weekends (23), whereas in another hospital the busiest hours were in the daytime and during the week (24). In one study, also, the majority of patients came to the emergency room because of accident-related injuries, and their visits could be classified as emergent or urgent (25). At another hospital, the majority of E.R. patients had nonurgent conditions (11,12). Thus, several basic questions in regard to emergency room use remain unanswered.

Possible reasons for such divergent results become clear when hospital location is considered as a potentially influential variable in emergency rooms utilization patterns. In particular, we found hospital location to be associated with the following: the characteristics of the general population served by the emergency room, the health care utilization patterns of these patients, the percentage of psychiatric patients visiting the emergency room, and the degree of urgency of the E.R. patients' conditions. The three E.R. rooms studied differed greatly because each served different populations and in different ways.

The urban hospital emergency room served a population that was largely poor, black, and single and without health insurance coverage or a regular source of health care, such as a family physician. A propor-

tionately greater number of psychiatric and nonurgent patients sought care at this facility than at the other two hospitals. In this respect the emergency room served as "the poor man's doctor" (11-12). In striking contrast, the emergency rooms of the residential and downtown hospitals served populations that were mainly middle class, white, and married and that had health insurance and a regular source of health care, such as a family physician. Patients at these emergency rooms were less likely to need psychiatric intervention and were more likely to have their visits classified as urgent. Thus, the results of our study support previous research showing that hospital location influences the kind of patient population that an emergency room will serve (15-17).

The study results also showed, however, that specific hospital organizational patterns influenced the utilization pattern of E.R. patients, even when those patients had similar demographic characteristics. For example, the residential hospital and the downtown hospital served similar patient populations, but the utilization patterns of their patients differed. First, a greater proportion of patients at the residential hospital had previously visited its emergency room, perhaps because physicians at this hospital often treated their private patients there after regular office hours. Thus, the emergency room served as an after-hours office for physicians affiliated with this hospital. A second differential pattern is that patients in the residential hospital were the least likely of the three patient populations to be admitted for inpatient care. A possible reason is that the residential hospital's emergency room serves as a receiving hospital for emergent and urgent cases from several smaller hospitals in the surrounding area. Thus, the needs of the larger community and the hospital's organizational patterns tend to shape the utilization patterns of the facility's E.R. patients. A third difference in utilization patterns is that the downtown

hospital's patients are most likely to be brought to the emergency room by ambulance. The explanation for this difference may be that although both of these hospitals have large paramedic programs, an emergency number for the downtown hospital is aired frequently on several local radio stations. Thus, people in distress are more likely to use this hospital's emergency service. Conversely, for the past 3 years, the residential hospital has sought to discourage any inappropriate use of its paramedic service.

In sum, we cannot talk about the emergency room or about the emergency room crisis (17), because one emergency room is not the same as another, and one standard model for dealing with E.R. issues will not work in every organization. The role that an emergency room assumes is shaped by the location of the hospital and the particular needs of its patient population and the community at large. This fact has implications for the way that each emergency room should respond to the population it serves in terms of staffing, referrals, and its relationship with any nearby outpatient clinic.

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SYNOPSIS

JONES, PAUL K. (Case Western Reserve University), JONES, SUSAN L., and YODER, LURA: *Hospital location as a determinant of emergency room utilization patterns. Public Health Reports, Vol. 97, September-October 1982, pp. 445-451.*

The use of the emergency rooms of three private, acute care, non-

profit hospitals was investigated in relation to each hospital's location. The emergency room of the hospital located in an urban poverty area served as the "poor man's doctor," whereas the emergency rooms of the two hospitals in more affluent areas served more traditional emergency room patients. Investigation showed

that even when patient populations were similar in demographic characteristics, the hospitals' locations influenced emergency room utilization patterns. Thus, one emergency room is not the same as another, and one standard model for dealing with emergency room issues will not work in every facility.

The Revised Estimated Survival Probability Index of Trauma Severity

PAUL S. LEVY, ScD
JACK GOLDBERG, MA
JANET ROTHROCK, MS

OVER THE PAST DECADE, THE MEASUREMENT of injury severity has been recognized as an important component of any study that attempts to evaluate the effectiveness of medical care among victims of traumatic injuries. Indices for measuring severity are usually based either on physiological variables (for example, blood pressure, capillary return, respiratory rate, response to stimuli) or on variables pertaining to the anatomic sites of the injuries. In retrospective studies based on examination of patient records, it is often not possible to use the indices based on physiological variables, since the needed information is frequently missing from the record or not reliable. In contrast, information on the anatomic sites of the injuries can often be found, albeit with some difficulty, on the hospital medical record; for this reason any measurement of injury severity done retrospectively from a medical record is likely to be based on anatomic information.

Of the anatomic indices that have been developed, the most widely used is the Injury Severity Score (ISS) (1,2). This index is a modification of an earlier index, the Abbreviated Injury Scale (AIS) which was origi-

nally developed for motor vehicle injuries. The AIS-ISS system of grading severity has undergone considerable evolution as experience in its use has accumulated, and an updated version appeared in 1980 (3).

An important limitation of the AIS-ISS system is that it entails a thorough examination of the body of the medical record to obtain the information on which severity is graded. The time required for such a thorough examination of records could make the costs of large multihospital studies prohibitively high and could seriously affect their feasibility. As an alternative to the AIS-ISS system of grading severity, we are proposing an index based on the International Classification of Diseases, Adapted (ICDA) conditions listed on the face sheet of virtually every medical record. Since it is based entirely on face-sheet information and hence does not require lengthy examination of the medical record, severity can be graded according to this index in a fraction of the time needed to obtain AIS-ISS scores. However, since the ICDA-8 system for categorizing traumatic injuries (ICDA 800-996) was not constructed for the specific purpose of scoring severity, several caveats (to be discussed subsequently) should be kept in mind when this index is used.

The index that we propose is called the Revised Estimated Survival Probability Index or RESP index. It is a modification of an earlier index called the Estimated Survival Probability Index or ESP index. Details on the development and validation of the ESP index have been published (4). We have used the ESP index in a large study evaluating the Illinois Trauma System (5,6).

The authors are with the Epidemiology and Biometry Program, School of Public Health, University of Illinois at the Medical Center, Chicago. Dr. Levy is professor and director, Epidemiology and Biometry Program; Mr. Goldberg is a research associate in epidemiology; Ms. Rothrock is a research assistant in epidemiology. The research was supported in part by grants No. HS 03058 and No. HS 04029 from the National Center for Health Services Research, Public Health Service.

Teaser requests to Paul S. Levy, ScD, Epidemiology and Biometry Program, School of Public Health, University of Illinois Medical Center, P. O. Box 6998, Chicago, Ill. 60680.

Methods

Conceptual model. The conceptual model for the RESP index is that the severity of multiple injuries with respect to "threat to life" can be expressed as a function of the severity of the individual injuries in terms of the threat to life existent if each injury were present as a single condition. In particular we used the following model:

$$P_{ijk\dots l} = P_i \times P_j \times P_k \dots \times P_l \quad (1)$$

where

$P_{ijk\dots l}$ = the probability of a patient surviving if he or she is admitted to the hospital with trauma conditions: $i, j, k, \dots, l$ (expressed as ICDA codes)

P_i = the probability of a patient surviving if he or she is admitted to the hospital with trauma condition i (expressed as an ICDA code) and no other trauma condition (P_i is called the single condition survival rate)

and

$P_j, P_k, \dots, P_l$ are defined similarly to P_i .

The basis of this model lies in the multiplicative law of probability; that is, if each trauma condition were acting independently of the other trauma conditions present with respect to threat to life, then the probability of a patient with multiple traumas surviving hospitalization would be equal to the product of the individual single condition survival rates, P_i , just described.

The model expressed in equation 1 is likely to be an oversimplification of the effects of multiple traumas, especially if several organ systems are involved in the injury. However, the rationale for this approach is that the product of the single condition survival rates might be a good enough approximation to stratify patients into groups.

With this conceptual model, our strategy was to obtain estimates of these single condition survival rates from an appropriate data source and to evaluate the utility of this model on a set of patients having multiple injuries.

Data source. The data used in constructing the Revised Estimated Survival Probability (RESP) Index are from the Hospital Discharge Survey (HDS), a nationwide probability survey conducted by the National Center for Health Statistics (NCHS) (7). In particular, we used standardized microdata tapes from the HDS covering the years 1971-75 for a total of 1,106,011 records. From this data set, a working tape was compiled consisting of all patients hospitalized with one or more trauma conditions (defined as ICDA-8 codes 800.0-939.0, 950.0-959.9, and 991.0-996.9). We did not include burns (940-949), adverse effects of chemical substances (960-989), effects of radiation (990), and complications of surgery or medical care (997-999) in our set of trauma conditions. If a patient had trauma diagnoses in both the inclusion range (800.0-939.0, 950.0-959.9, and 991.0-996.9) and the exclusion range (940-949, 960-989, 990, 997-999), that case was excluded from the working tape.

Table 1. Selected age-specific regression adjusted single condition survival rates

ICDA codes	Estimated single condition survival rates (P_{ia})		
	Under 45 years	45-64 years	65 years and older
Closed fracture of base of skull (801.0)	.9898	.9466	.9225
Closed fracture of pelvis (808.0)	1.0000	.9568	.9320
Fracture and fracture dislocation of vertebral column with spinal cord lesion (806.0, 806.2, 806.4, and 806.6)	.9587	.8304	.7590
Closed fracture of scapula (811.0)	1.0000	1.0000	1.0000
Cerebral laceration and contusion (851.0)	.9350	.8852	.8575
Injury to spleen without mention of open wound into cavity (865.0)	1.0000	.8359	.7423
Injury to other and unspecified intra-abdominal organs with open wound into cavity (868.1)	.9839	.6182	.4145

From our resulting trauma set (103,517 patients), a 75 percent systematic sample was taken. This data set, (77,600 patients) contains 61,419 patients with only 1 trauma condition and is the base we used to estimate the single condition survival rates.

Estimation of single condition survival rates. For each of 3 age groups (under 45 years, 45-64 years, and 65 years and older) estimated single condition survival rates, P_{ia} , were obtained from 61,419 records for each 4-digit trauma code (for example, 803.1). The subscripts i and a in the symbol P_{ia} specify ICDA condition and age respectively. Because of the large number of 4-digit trauma codes, some codes representing similar conditions or contiguous anatomic sites were grouped (for example, patients hospitalized with the condition 806.0, 806.2, 806.4, or 806.6 were grouped together) and the preliminary single condition survival rates were computed for the grouped codes. The algorithms used in estimating the rates follow; they represent standard methodology for obtaining unbiased estimates from complex sample surveys (8).

$$P_{ia} = \sum_{j=1}^{n_{ia}} W_{aif} X_{aif} \div \sum_{j=1}^{n_{ia}} W_{aif}$$

where

P_{ia} = the preliminary single condition survival rate for individuals in age group a for the group of patients having trauma condition i

X_{aif} = 1 if the j th record among patients who are in group a and have trauma condition i has discharge status "alive"

0 if the discharge status is "dead"

W_{aif} = the HDS weight associated with the j th record among patients who are in age group a and trauma condition i . This weight signifies the number of discharges represented by a particular record selected in the HDS sample.

and

n_{ia} = the number of persons who are in age group a and have a trauma condition i .

It should be noted that NCHS provides a uniform set of instructions to hospitals for determining whether a case is included within the scope of the HDS sampling frame. In particular, patients must be admitted to the hospital to be considered eligible for the survey. This condition is especially important for patients who are discharged dead. Patients who die in the emergency department are strictly excluded from the HDS (9).

Use of regression to improve the reliability of the age-specific single condition survival rates. In computing the final survival rates, several steps were taken.

1. For each ICDA condition or group of conditions, 3 estimated preliminary age-specific single condition survival rates, P_{ia} , were computed as described previously, one for each age group (under 45, 45-64, 65 or older). These three rates served as the dependent variable.

2. The midpoints, 22.5 years and 55 years, of the age groups under 45 years and 45-64 years were chosen to represent these groups; the mean 73.1 years of those who were 65 years or older was chosen to represent this age group. These three points served as the independent variable.

3. The number n_{ia} of persons in age group a having trauma condition i served as weights in the calculation of weighted regression coefficients.

4. If the sum of all 3 age groups of the n_{ia} was less than 20 for a trauma condition, that condition was deleted from the group of trauma conditions.

5. With n_{ia} as weights, the P_{ia} as dependent variables, and the ages 22.5, 55, and 73.1 as independent variables, a slope and intercept were estimated by

weighted least squares for those ICDA codes for which

$$\sum_{a=1}^3 n_{ia} \geq 20.$$

6. Final single condition survival rates P_{ia} were obtained for each of the 3 age groups by computing from the regression line, values at the points 22.5, 55, and 73.1. In those few cases where values above 1.00 were obtained, they were truncated to 1.00.

The rationale for the procedure just outlined is that, for many of these trauma conditions, fatality increases with age. Thus, a fitted regression line making use of this relationship is likely to increase the reliability of the estimated single condition survival rates. The number of cases in each age group was used as weights so that preliminary single condition survival rates based on small n_{ia} 's would not unduly influence the estimated regression line. It should be emphasized that the primary reason for computing the linear regression model was to increase the reliability of the P_{ia} 's. More complex nonlinear relationships between age and the P_{ia} 's could not be explored with three data points. Increasing the number of age-specific single condition survival probabilities beyond three would have led to decreases in the reliability of the initially estimated P_{ia} 's.

A total of 531 single condition survival rates, P_{ia} , were computed (177 codes by 3 age groups), and a sample of these is shown in table 1. The complete set is available on request from the authors. Again, these regression-adjusted single condition survival rates are the building blocks of which the RESP index is constructed.

Of the 177 trauma conditions for which regression lines were calculated, only 24 (13.5 percent) involved fewer than 30 persons over the 3 age groups (that is,

$\sum_{a=1}^3 n_{ia} < 30$). The median number of persons on which the regression lines were based was 90, and the regression line for 57 (32 percent) of the 177 conditions was based on 200 or more cases. The distribution of these 177 P_{ia} is shown for each age group in table 2.

Computation of the RESP index. For each patient in the entire trauma set having one or more trauma conditions for which the estimated single condition survival rates, P_{ia} , have been computed, the RESP index was obtained by taking the product of the P_{ia} over all trauma conditions listed for the patient. For example, if patient j in age group a had trauma conditions i, k ,

Table 2. Distribution of ICDA codes from source group in ranges of regression-adjusted estimated single condition survival rates, by age group

Range of rates P_{ia}	Under 45 years	45-64 years	65 years or older
.0000-.8000	1	5	9
.8001-.9000	3	11	15
.9001-.9800	15	36	38
.9801-.9959	29	21	11
.9960-.9985	12	10	3
.9986-.9999	9	9	0
1.000	108	85	101
Total	177	177	177

and m , then the RESP score S_j for this patient is computed:

$$S_j = P_{ia} P_{ka} P_{ma}$$

Validation methodology for the RESP index. The conceptual model for the RESP was tested by examining the linear relationship between RESP and mortality. The data set used for validation consisted of all multiple trauma patients in the 75 percent sample of HDS. This sample is equal to 14,824 persons with more than one trauma ICDA code listed.

One method for examining the relationship between a dichotomous dependent variable (such as mortality) and a continuous independent variable (such as RESP) is the logistic model. The specific logistic model examined takes the form:

$$\text{Logit } P_i = \alpha + \beta X_i$$

where

P_i = the probability of death from multiple trauma
 X_i = RESP index for patient i

and

$$\text{Logit } P_i = \ln \frac{P_i}{1-P_i} = \text{the natural logarithm of the odds of death from multiple trauma}$$

The α and β regression parameters are estimated by maximum likelihood methods using standard computer programs (10). The focus of the validation is on the β parameter; if this parameter is negative and significant, it will indicate that there is a linear relationship between RESP and mortality.

In addition to the logistic regression fit to the continuous values of RESP, the $\ln$ odds for seven categories of RESP was obtained by a simple cross-classification. The seven categories are defined as follows: $\leq .5000$, .5001-.6000, .6001-.7000, .7001-

.8000, .8001-.9000, .9001-.9500, .9501-1.0000. The classes selected represent deciles except for the $\leq .5000$ group, where there are few cases, and the .9001-.9500, .9501-1.0000 groupings, where the greatest number of trauma patients are found.

Graphs of the $\ln$ odds against RESP values are then obtained for both the logistic model and the categorical data. For the logistic model the relationship between the $\ln$ odds and RESP is constrained to be linear. However, plots of the $\ln$ odds from the categorical data (plotted at the mean RESP value for each category) are not forced to be linear. By comparing the graph from the logistic model with that obtained from the categorical data, departures from linearity can be identified. A close "fit" between the two graphs would be interpreted as strong evidence of the linear relationship between RESP and mortality.

The logistic model between RESP and mortality is analyzed for selected groups of patients. Models are fit for all multiple traumas, separately for patients with two, three, four, and five trauma conditions, patients with intracranial injuries (ICDA 850.0-854.9), and patients with cerebral lacerations and contusions, without mention of open intracranial wound (ICDA 851.0). The objective of these separate analyses is to determine the ability of RESP to discriminate among groups of patients even when matched on the number or type of traumatic conditions.

Results

Table 3 presents the results of seven logistic regressions between RESP and mortality. For each analysis the number of records, the beta coefficient, and the standard error are presented. The beta coefficients are large and negative for all models. Likewise, the P values are highly significant for each logistic model.

For the four separate strata based on the number of trauma conditions, the beta coefficients exhibit a trend of decrease with the increasing number of trauma diagnoses. For example, the beta coefficient for the continuous RESP model with patients having 2 trauma conditions is -11.5 while that for patients with 5 trauma conditions is -7.6 . This pattern in the individual beta coefficients makes intuitive sense because differences between RESP scores for deaths and survivors among patients sustaining two or three injuries is apt to be more pronounced than in the group of patients with five trauma conditions. Further support is given to the RESP index by examining the beta coefficients for the subset of patients with intracranial injury and cerebral lacerations and contusions. Again, the relatively large negative values of the co-

Table 3. Logistic regression analysis of mortality and RESP for the 75 percent sample of multiple trauma patients and separately for patients with two, three, four, and five trauma conditions, patients with intracranial injuries, and cerebral lacerations and contusions

Data set analyzed	Number of patients	Beta	Standard error
All multiple trauma	14,824	-10.8097	.4810
2 trauma conditions	10,591	-11.5004	.7015
3 trauma conditions	3,011	-9.2010	.8934
4 trauma conditions	909	-9.4708	1.2582
5 trauma conditions	313	-7.5716	1.6274
Intracranial injury	4,801	-8.9037	.5825
Cerebral lacerations and contusions	528	-7.7249	1.5778

NOTE: P values for all betas are $< .0001$.

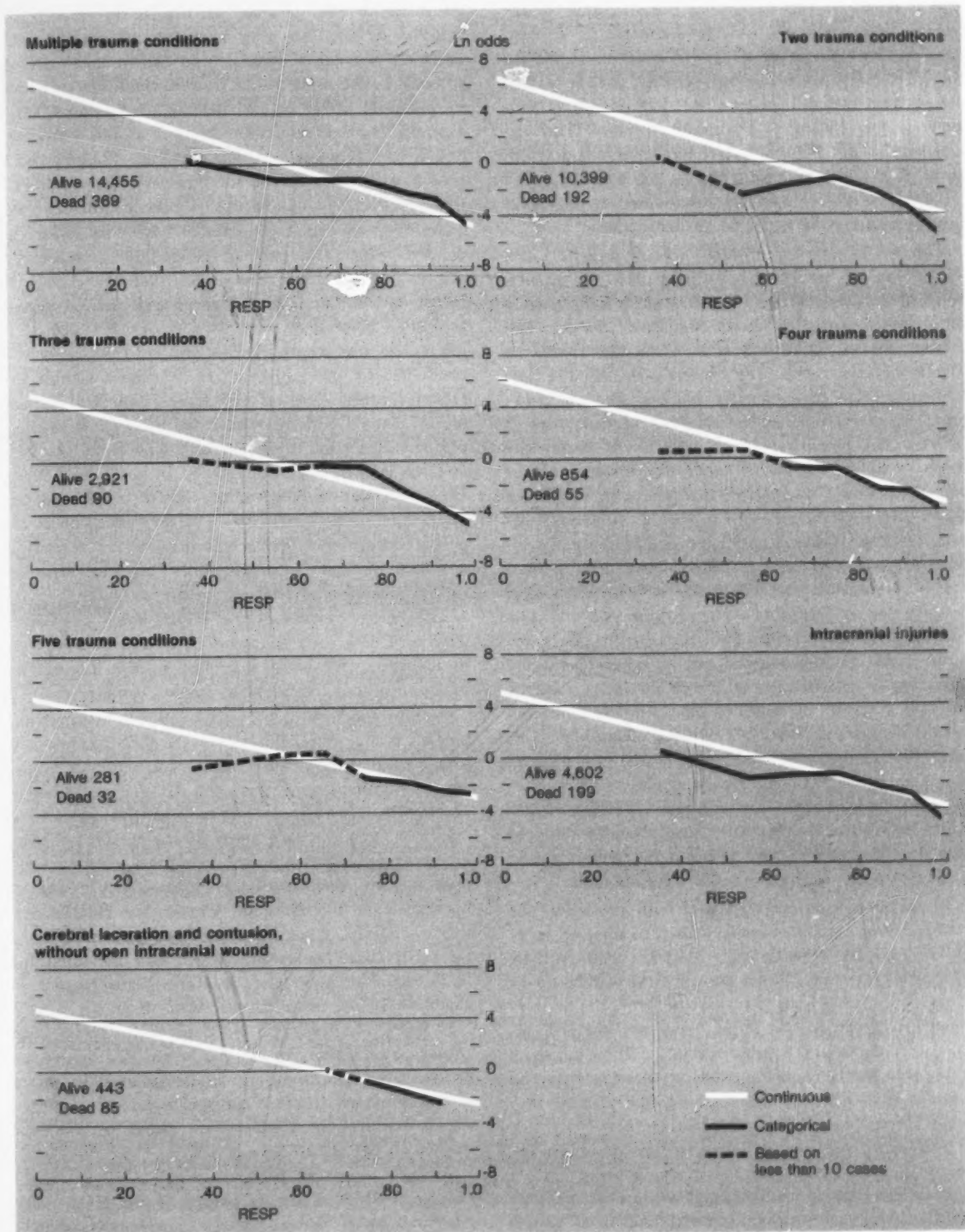
efficients indicate the linear relationship between RESP and mortality even within these two intrinsically severe subsets of patients.

The chart portrays the relationship between RESP and $\ln$ odds for both the continuous and grouped data. For the total multiple trauma data set, there is a close parallel between the grouped and continuous models at all levels of RESP; the only divergence observed is at RESP values of less than .60 where the continuous model predicts slightly higher values of the $\ln$ odds than the grouped data indicate. The plots for the subset of patients with two, three, four, and five trauma conditions (see chart), indicates a close fit between the logistic model and the categorical data. For the group with two conditions, some deviation from the linear fit is observed at RESP values of less than .70, where the logistic tends to overpredict the observed $\ln$ odds. It is especially interesting to note the close parallel between the logistic model and the categorical plots for patients with four and five trauma conditions. Finally, the graphs for intracranial injuries and cerebral lacerations and contusions demonstrate a remarkably close fit between the logistic model and grouped data. Even for the group with cerebral lacerations and contusions, a condition which has a 16.1 percent overall mortality rate, the RESP is clearly able to order patients according to severity. (Categorical plots for the two classes $\leq .5000$ and .5001-.6000 could not be obtained since these classes contained one case each; likewise, no cases could occur in the .9501-1.0000 class because of the severity of cerebral lacerations and contusions).

Discussion

In the development of single condition survival rates for the earlier ESP index, decimal ICDA numbers were collapsed into integer codes (for example, 800.0

Ln odds against the continuous Revised Estimated Survival Probability and the RESP grouped into seven categories for patients with trauma conditions



and 800.1 into 800). It is often the case, however, that a set of trauma conditions differing only in the fourth digit represents a wide spectrum of severity. Also, the single condition survival rates developed for the ESP index were not age specific, and it is well known that age is an important determinant of outcome among victims of traumatic injuries. These deficiencies in the ESP index have motivated the development of its successor, the RESP index, which is based on single condition survival rates that are both age specific and specific to ICDA decimal codes.

The set of properties which a good severity index should possess has been recently debated by participants at a conference on trauma severity indices sponsored by the National Center for Health Services Research, Public Health Service, and the American Trauma Society (11). The consensus among the participants of this conference is that outcome prediction (that is, correlation with indicators of outcome) is perhaps the most important property of a severity index. With this objective in mind, the main thrust of our validation studies was to examine how well the RESP index correlates with a specific outcome measure, namely mortality. More specifically, since the intended use of the index is an adjustment for patient mix in retrospective studies based on hospital medical records, we believe that demonstration of a strong monotonic relationship between RESP scores and mortality would provide a good test of criterion validity with respect to this intended use of the index. Clearly, the strong linear relationships shown in the chart between the index and mortality among all patients with multiple traumas, among those with multiple traumas involving intracranial injuries, and among those having cerebral lacerations and contusions (ICDA 851.0) along with other trauma conditions provides evidence that the index can be used to adjust for patient mix in studies using mortality as the outcome variable.

In addition to correlating well with mortality, the RESP index correlated well with an index of morbidity developed recently by Gustafson and co-workers (11). In that study, based on a review of 100 medical records of hospitalized trauma patients, the product moment correlation coefficient between the RESP index and the morbidity index was 0.57. Using the same series of patients Gustafson and co-workers correlated their morbidity index with ISS, and the product moment correlation coefficient was 0.44.

The strong gradient demonstrated in the chart between the RESP index and mortality among patients having cerebral lacerations and contusions (ICDA 851.0) along with other trauma conditions is encouraging because of the intended use of this index in

tracer studies. In such studies, ascertainment is on the basis of the presence of one or more selected conditions. The fact that a strong relationship was observed between the index and the *ln* odds among persons having a particular trauma condition indicates its potential utility in such studies as a control variable for multiple injuries. Although ICDA condition 851.0 was presented as an example, findings were similar to those observed for other specific conditions that had sufficient numbers to be examined in this way.

Another important property of a severity index indicated by the participants of the conference on severity indices (11) is that of construct validity. This criterion means that it should agree well with objective indicators of severity such as cost of care, physician judgments, treatments selected, and so forth. In a study conducted by the University of Wisconsin Center for Health Systems Research and Analysis, medical records of 100 trauma patients were rated by a panel of physicians with respect to severity on a scale from 0 to 100, and the records were also graded by the RESP index (11). Correlation between the RESP index and the physician ratings was -0.67 (the negative sign is expected since high RESP scores indicate low severity); a similar analysis performed with ISS and physician ratings yielded a correlation coefficient of 0.67.

The earlier version of the RESP index has correlated well with such indicators of severity as admission to intensive care units, transport to the hospital by ambulance, and treatment at trauma centers (6).

A third property of a severity index considered important is that of reliability. For the RESP index, it is important that the single condition survival rates, which are the parameters on which the RESP index is based, be reliable. These single condition survival rates were obtained from the face sheet of the medical record. The diagnoses written on the face sheet are abstracted onto a form and are later given ICDA codes by nosologists at the National Center for Health Statistics (NCHS). A quality control system is maintained for all medical coding of NCHS data including the HDS, so that inter-rater reliability with respect to assigning ICDA codes to the listed diagnoses is at a high level. The intended use of the index in the field would be to mirror, within the limits of available resources, the HDS procedure. In particular, descriptions of conditions on the face sheet of the medical record would be abstracted and later coded by someone trained in the ICDA system.

A recent report by the Institute of Medicine (IOM) was an analysis of the reliability of the HDS (12). A conclusion of the report was that the reliability of the HDS was not satisfactory. In particular, the IOM

researchers found the reliability of nonmedical information above 90 percent; for diagnostic information, the HDS abstract and the IOM reabstract agreed on the principal diagnosis in 63.4 percent of the cases at the 4-digit level of ICDA-8 coding. Their principal recommendation was that a more complete review of the entire medical record (especially the narrative discharge summary) would improve HDS diagnostic reliability.

Does the IOM study impugn the validity of the RESP index? First, reliability in the IOM study included both ordering and coding errors; in the construction of the RESP index the ordering of primary, secondary, and tertiary diagnoses has no impact. Only cases with single trauma diagnostic codes, whether primary or not, were used in estimating the P_{ia} 's. Second, the reliability of the HDS should be examined in terms of its biasing impact on the RESP. That is, if the errors in ICDA trauma codes are random and not related to underlying injury severity, the effect on the calculation of the P_{ia} values and the subsequent RESP scores would be negligible.

To understand further the potential biasing impact of the unreliability of face-sheet information, we are currently conducting studies involving primary data collection. The results will be reported when the studies are completed.

Unlike the AIS system, which was developed with the specific objective of grading injury severity, trauma codes in the ICDA system do not always characterize the severity of an injury. Any index based on ICDA codes should therefore be considered a pragmatic tool and should be used primarily as a covariate in studies involving groups of patients rather than for prognosis, triage, or audit of individual patients. So long as the ICDA system remains as the "universal" system for categorizing disease including injuries, ICDA codes will be obtainable more readily than AIS codes. For

this reason, an index based on ICDA codes is needed, and the RESP index, because it is easy to use and has demonstrated high association with fatality and morbidity in a variety of settings, is a potentially useful tool in trauma studies.

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SYNOPSIS

LEVY, PAUL S. (University of Illinois School of Public Health), GOLDBERG, JACK, and ROTHROCK, JANET: *The Revised Estimated Survival Probability Index of Trauma Severity. Public Health Reports*, Vol. 97, September-October 1982, pp. 452-459.

The construction of a revised version of the Estimated Survival Probability Index (or ESP index) is described. The original index had been

proposed as a tool that would be useful in grading from hospital medical records the severity of injuries sustained by patients hospitalized with trauma conditions. The revised index (RESP) is based on a data set of 61,419 records. Unlike the ESP, the RESP index is based upon parameters that are age specific and specific to decimal ICDA codes. The RESP is validated by correlating RESP scores

with observed mortality by using an independent set of multiple-trauma patients. Overall, a strong monotonic relationship between the RESP index and increasing mortality was demonstrated. Also, the RESP index correlated with mortality in selected subsets of multiple trauma patients with extremely severe injuries. Some uses and limitations of this index are discussed.

Factors Affecting Streptococcal Colonization Among Children in Selected Areas of Alaska

LARRY J. BRANT, PhD
THOMAS R. BENDER, MD, MPH
RICHARD W. MARNELL, BA

SEQUELAE OF STREPTOCOCCAL INFECTION are important public health problems in the developing countries of the world (1-3). Of these well-recognized diseases, rheumatic heart disease is of particular concern for both medical and financial reasons. Because of this concern and because rheumatic heart disease is potentially preventable, much emphasis is placed on primary prevention.

Most Alaskan Eskimos live in regions that are similar in many respects to a developing country. The lifestyle of the people in these areas is predominantly one of subsistence. Roughly 80 percent of these Eskimos live in small, isolated villages along the coast of the Bering Sea and inland along the western rivers. Because there are few physicians in these villages, community health aides have been trained to provide primary health care to the villagers. As substitute physicians, the community health aides emphasize clinical care, health education, and prevention.

During a 15-year period ending in the early 1970s, an average of 30 cases of acute rheumatic fever were

diagnosed each year for Alaskan Natives. For patients aged 5-19 years who met the revised Jones criteria, the overall average annual rate for Eskimos in this age group living along the western coast was 84 per 100,000 population. Because treatment of each case of rheumatic heart disease was estimated (in 1971 dollars) to cost the health-care system between \$50,000 to \$75,000 on the average, prevention efforts seem to be the most cost-effective approach (data from Kenneth J. Fleschman, MD, Chief of Pediatrics, Alaska Area Native Health Service).

To deal with the problem of rheumatic heart disease, a streptococcal control and prevention program for Eskimo children in western Alaska was established in 1971 by the Center for Disease Control, the Alaska Area Native Health Service, and the Alaska Federation of Natives. The program was in effect for 5 years, from 1971 to 1976. Various aspects of this program were reported earlier (4-6). The purpose of the program was to control streptococcal infection, prevent its spread, and obtain additional information on the epidemiology of streptococcal disease. One aspect of the program was an investigation of the association between a number of possible risk factors and the prevalence of streptococci among Eskimo children.

Methods

For purposes of political, social, and medical administration, Eskimo villages in western Alaska are divided into three geographic regions: Norton Sound, Yukon-

Dr. Brant is a mathematical statistician, Human Performance Section, Gerontology Research Center, National Institute on Aging, National Institutes of Health, Baltimore City Hospitals, Baltimore, Md. 21224. Dr. Bender is Chief and Mr. Marnell is a computer specialist, Alaska Investigations Division, Centers for Disease Control. Dr. George W. Comstock, Alumni Centennial Professor, Johns Hopkins University, School of Hygiene and Public Health, Baltimore, assisted with the preparation of this manuscript. Tearsheet requests to Dr. Brant.

Table 1. Population of children in study villages of each region

Village	Number of children per age group (years)				Total
	3-6	7-9	10-12	13-18	
Norton Sound:					
St. Michael	5	17	18	9	49
Stebbins	18	18	20	10	66
Unalakleet	21	37	45	28	131
Yukon-Kuskokwim:					
Atmautiuk	3	16	13	7	39
Kasigluk	7	26	29	11	73
Nunapitchuk	24	29	22	30	105
Bristol Bay:					
Manokotak	22	29	23	11	85
Togiak	28	39	32	38	137
Twin Hills	0	9	7	5	21

Kuskokwim, and Bristol Bay. Three villages from each of these regions were chosen for the control and prevention project. Each is characteristic of its geographic region, and each has had reported cases of rheumatic fever. In these villages, 1,099 children were 3-18 years (the age group considered to be at highest risk for rheumatic fever).

Since earlier investigators (6) found that the prevalence of streptococci in years 2-5 of the study was similar but different from the prevalence in year 1 (indicating that the program began to reach full effectiveness by year 2), our focus in this report is on

the effect of risk factors observed in year 1 on the prevalence of streptococci in year 2. The data collected for 706 children aged 3-18 years with complete records from years 1 and 2 were considered for further analysis. Table 1 shows the age distribution of these children by village and region.

Data were collected by means of long-term surveillance techniques, similar to those tried in the Rocky Mountains of the United States (7,8). Community health aides collected swabs for throat cultures from each patient who was seen in the clinic and had symptoms of streptococcal pharyngitis. In addition, children from each village were divided into four groups similarly distributed by sex and grade in school. Children from the same family were placed in different groups if possible. While school was in session, the health aides collected specimens for cultures from members of one of the four groups of children each week. These specimens were collected without regard to symptoms so that every child would have had a specimen taken for throat culture at least once every 4 weeks. Asymptomatic children were not under surveillance during the summer when school was not in session.

Throat swabs were placed in silica gel and mailed to central laboratories in Anchorage or Bethel for processing. Beta hemolytic streptococci grown in pour plates were grouped by bacitracin sensitivity and Lancefield precipitation methods. Group A isolates were typed by T-agglutination and M-precipitation

methods (9). Each week the laboratory reported positive results to the community health aide by telephone, radio, or teletype. Children with group A streptococci were treated with benzathine penicillin. When an important epidemic trend within a village was apparent, all the children included in the program were placed on a prophylactic regimen of benzathine penicillin (10).

The investigation of the effect of several important and identifiable risk factors on the prevalence of streptococci was accompanied by an analysis of information obtained during the 2 consecutive years of the study (1971-72). Data collected by year included age and sex of each child, number of children in each household, proportion of throat cultures positive for streptococcal organisms, and the health-aides' rating. Health aides from each village were rated by a team of physicians and nurses who taught the aides how to conduct the program and who visited periodically to monitor performance or investigate epidemics. The ratings were based on the health aide's overall performance in effectively promoting good hygiene, providing general health care, and managing daily specimen culturing and treatment activities. Special attention was given to the aide's management of the program, that is, his or her expediency in handling the throat swabs (minimizing the time required between taking of swab and mailing) and his or her expediency in administering treatment to children with confirmed positive cultures.

We used a multiple-regression model (11,12) to examine the data on the 706 children selected for analysis. Using the rate of positive throat cultures (colonization rate) during the second year for each child as the dependent variable, we considered the effects of six independent variables or factors: age, sex, number of children in household, region, health-aide rating, and colonization rate for each child the first year. Each factor was subdivided into classes of investigative interest and partitioned so that each class contained a meaningful number of observations. The classes then were expressed by means of categorical variables in the multiple-regression model.

Results of the regression analysis were used to obtain adjusted colonization rates for each category or class of every factor (13). Adjusted rates provided a standardized colonization ratio, which measured the risk of being in a particular class of a given factor, while the effects of all other specified factors were held constant. The standardized colonization ratio for a given factor and class was defined as the percentage of the corresponding adjusted rates to the overall crude colonization rate.

Results

In examining the effects of the six previously mentioned independent or explanatory variables, we found that age, health-aide rating, previous colonization rate, and health-care region were significantly associated with streptococcal colonization.

Table 2 shows the distribution of Eskimo children in the first year of the project with regard to the six risk factors selected, along with corresponding crude rates of streptococcal colonization for each class of each factor calculated for the second year. Of the 706 children studied, 353 had streptococcal organisms in at least 1 throat culture the second year, which indicates an overall crude colonization rate of 50 percent. An examination of crude rates per 100 children for the independent risk factors showed that age produces the most extreme variation—ranging from 32.9 for the age group 13-18 years to 62.5 for the age group 3-6 years. On the other hand, crude colonization rates for Eskimo boys and girls differed by only 1.4 percent, indicating only a small variation by sex.

Table 2 also shows adjusted rates of streptococcal colonization obtained from the regression analysis. The factors having the greatest significance or the greatest association with colonization rate in the second year were age, health-aide rating, and colonization rate the first year ($P < 0.01$), and of lesser significance, health-care region ($P < 0.05$). Note that the adjusted rates decrease with improved ratings of the health aide, as might be expected. Children who received care from health aides who were rated above average had an adjusted rate 31 percent lower than that for children cared for by aides who were rated below average.

Finally, table 2 shows the standardized colonization ratio for each class of a given factor, that is, an estimate of the percentage of overall risk that we would expect if every child in our population were in the same class of a given factor and the effect of the other risk factors were removed. The largest standardized colonization ratio was 122 percent for children 3-6 years old, and the smallest was 67 percent for children 13-18 years old.

Discussion

A binary variable multiple-regression model was used to assess the effect of several risk factors related to streptococcal colonization in a population of Alaskan Eskimos with a high annual incidence of acute rheumatic fever. The adequacy of the model for these data and its simplicity of computation and interpretation of results have made it the method of choice here over other more theoretically appealing but complicated

models such as the multiple logistic one. Analysis by the multiple logistic model resulted in conclusions similar to those we have presented.

Our analysis indicates that four of the six independent risk factors contributed significantly to the prevalence of streptococcal colonization. There was a definite association between age and colonization, a relationship observed by other investigators (14).

Another factor strongly associated with colonization was the rating of community health aides. This association indicates the importance of good health care in controlling the spread of streptococcal organisms. Attributes associated with an above-average health-aide score included the expedient and careful handling of collected throat swabs and the efficient and effective administering of treatment to children found to have positive cultures. This health-aide rating reflects not only the health-aides' ability to do their daily job of promoting good hygiene and providing good medical care, but also their efficiency in minimizing the time between throat swabbing and treatment of children with positive results. Consequently, proper selection and training of health aides is crucial in a region where highly trained medical personnel are not immediately available. Standardized colonization ratios corresponding to health-aide ratings (table 2) indicate

that the overall rate of streptococcal colonization might be reduced 25 percent if all villagers could receive above-average health-aide care.

The colonization rate for the first year had a highly significant association with later streptococcal colonization. This finding indicates that the same children tended to have positive throat cultures in both years.

One final factor somewhat less significantly associated was health-care region. The relationship of health-care region to streptococcal colonization may indicate the importance of geographic distribution of streptococcal organisms in this remote area of Alaska. This relationship could also reflect delays in processing cultures or reporting positive results as a result of the variables of transportation and communication in different regions.

The other two risk factors, sex and number of children in the household, were not significantly related to streptococcal colonization. Other investigators (15, 16) have reported similar findings with regard to sex. The conclusion that number of children in the household was not associated with streptococcal colonization agrees with similar findings reported from Ethiopia (16) regarding overcrowding in the home. Yazov and associates (16) observed that many Ethiopians live in well-ventilated huts and spend most of their day in the

Table 2. Distribution of children, second-year crude and adjusted rates of streptococcal colonization per 100 children, and corresponding standardized colonization ratios for various risk factors

Factor	Number of children	Percent of total number of children	Crude rate	Adjusted rate	Standardized colonization ratio (percent)
Overall	706	100.0	50.0	...	100
Age group (years): ¹					
3-6	128	18.1	62.5	60.9	122
7-9	220	31.2	57.7	57.3	115
10-12	209	29.6	46.4	47.3	95
13-18	149	21.1	32.9	33.6	67
Sex:					
Male	359	50.8	49.3	48.7	97
Female	347	49.2	50.7	51.3	103
Number children in household:					
1	69	9.8	43.5	47.6	95
2-3	289	40.9	46.0	46.6	93
> 4	348	49.3	54.6	53.3	107
Health-care region: ²					
Norton Sound	246	34.8	45.1	43.8	88
Yukon-Kuskokwim	217	30.7	51.2	57.1	114
Bristol Bay	243	34.5	53.9	49.9	100
Health-aide rating: ¹					
Below average	310	43.9	55.5	54.6	109
Average	302	42.8	47.7	49.1	98
Above average	94	13.3	39.4	37.6	75
Colonization in first year: ¹					
No	288	40.8	41.7	42.8	86
Yes	418	59.2	55.7	55.0	110

¹ Chi-square test on adjusted rates yields $P < 0.01$.

² Chi-square yields $P < 0.05$.

open air. On the other hand, Eskimos spend long periods indoors in an overcrowded environment at home, at school, and at other community gathering places. Additional children in the home contributed little to the almost universal overcrowding and hence did not appear to affect the risk of streptococcal colonization.

One final and yet highly important application of our multiple-regression model is in describing the conditions under which a child is at greatest risk of being colonized by streptococci. Children at the greatest risk were in the age group 3-6 years, had a history of streptococcal colonization, and lived in a village receiving below-average health-aide care in the Yukon-Kuskokwim health care region. Risk of colonization for such a child was 82 percent. An estimate of risk such as this can be particularly useful in planning for effective and economical disease prevention and control.

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SYNOPSIS

BRANT, LARRY J. (National Institute on Aging, Baltimore City Hospitals), BENDER, THOMAS R., and MARNELL, RICHARD W.: *Factors affecting streptococcal colonization among children in selected areas of Alaska. Public Health Reports, Vol. 97, September-October 1982, pp. 460-464.*

The epidemiology of streptococcal disease affecting 706 Alaskan Eskimo children was investigated by analysis of data on throat cultures obtained during a long-term surveillance pro-

gram begun in 1971. A binary variable multiple-regression model was used to study the association between streptococcal colonization of these children and six potential risk factors: age, sex, number of children in household, region, health-aide rating, and colonization rate for each child the previous year. Factors found to be significantly associated with streptococcal colonization included age, past colonization, competence of local health-aide in providing care, and health-care region. Age varied most in the standardized

colonization ratio (percentage of corresponding adjusted rate to overall crude colonization rate), ranging from 122 percent for children 3-6 years old to 67 percent for children 13-18 years old.

The number of children in overcrowded homes and a child's sex were not apparently important. The method of analysis can be used to provide health-care planners with a simple means of identifying potentially important areas of concern for planning effective and economical health-care strategy.

Effects of Characteristics of the Survey Instrument on Response Rates to a Mail Survey of Community Hospitals

ROSS M. MULLNER, PhD

PAUL S. LEVY, ScD

CALVIN S. BYRE, PhD

DALE MATTHEWS, BS

MAIL SURVEYS are an important means of obtaining information about the operation of the nation's community hospitals, which the American Hospital Association (AHA) defines as all non-Federal short-term general and other special hospitals—excluding hospital units of institutions—whose facilities and services are open to the public. As is the case with all surveys, the reliability that may be attributed to their findings depends largely on the rates of response to them. If health-care researchers are to increase the reliability of studies using such surveys by increasing the rates of response to them, they must understand what factors determine response rates.

In an earlier study (1), we examined the relationship between response rates and one set of elements in mail surveys of community hospitals; those elements were the institutional characteristics of the hospitals surveyed. We found that bed size, location within or outside a Standard Metropolitan Statistical Area (SMSA), AHA membership status, investor or other form of ownership, and control by State or local government or by another type of organization are strongly and independently associated with hospitals' rates of response to AHA surveys.

In the present study we controlled for the effects of these institutional characteristics on response rates while investigating the relationship between response rates and another set of elements in a survey of community hospitals, elements pertaining to character-

istics of the survey instrument itself: the perceived length of the questionnaire, the order of questions, the orientation of the appeal made in the cover letter, and the inclusion of a promise to share the results of the study with respondents. These are among the elements of the survey process that can be most easily and economically manipulated by researchers.

Studies that have been reported in the literature of the relationship between such elements and response rates have dealt with household surveys or surveys of individuals rather than with surveys of institutions and have yielded results that are diverse and often conflicting.

In several studies, the relationship between the form of questionnaire (its perceived length and appearance) and response rates was investigated by varying the number or dimensions of the pages of the questionnaires while keeping the survey questions constant. Champion and Sear (2), rather surprisingly, found that of their 3-, 6-, and 9-page questionnaires, the longer ones tended to achieve the highest response rates. Childers and Ferrell (3) found no significant differences between the response rates to a 1-sheet (front and back) and a 2-sheet questionnaire, while 8½" x 11" paper, trim size, met with a better response rate than the 8½" x 14." Ford (4) found no significant differences between the response rates to questionnaires printed on 4-page 8½" x 11" folders and those mimeographed on 1 side of 4 pages of 8½" x 14" paper; although the order of questions varied slightly between the forms, it had no effect on response.

The effect of the ordering of questions on response rates has, in fact, received little attention in the literature. Ferber (5) dealt only with the effect of the order of questions on response bias; some of the data

Dr. Mullner is associate director, Hospital Data Center, American Hospital Association, 840 North Lake Shore Drive, Chicago, Ill. 60611. Dr. Levy is director, Epidemiology and Biometry Program, School of Public Health, University of Illinois, at the Medical Center, Chicago. Dr. Byre and Mr. Matthews are project directors, Hospital Data Center, American Hospital Association. Tearsheet requests to Dr. Mullner.

he presents, however, suggest that it had some effect on his response rates as well.

In numerous studies investigations were made of the relationship between response rates and various rhetorical strategies employed in the cover letter to elicit cooperation. Hendricks and associates (6) found that the "ingratiation tactics" of using adjectives flattering the respondent and adjectives flattering the solicitor had no effect on response rate when the questionnaire was short. When the questionnaire was long, on the other hand, the two tactics combined reduced the response rate; used separately, the two tactics increased the response rate. Linsky (7) found that explanations of the place and importance of the respondent in the study increased response rates, while arguments for the social utility of the research and appeals to help those conducting the study had no effect. Champion and Sear (2) found that "altruistic" appeals made on the grounds that the results of the survey would benefit the research organization met with lower response rates than did "egoistic" appeals made on the grounds that the results would benefit the respondent. Jones and Linda (8) found that cover-letter messages stressing that the survey results would benefit the respondent and altruistic appeals stressing the benefits to "science" achieved similar response rates, which were significantly higher than those achieved by messages stressing the benefit to the survey sponsor. The inconsistent findings of these studies seem in part to be due to conceptual vagueness in determining just what cumulative functions were being performed by the elements in the letters that were manipulated, and, in part, as Jones and Linda (8) point out, to population differences, nonstandardized message manipulations, and "occasional confounding of cover letter manipulation with message order and cover letter length changes."

Although inclusion in the cover letter of a promise to share the results of the study with the respondent might, hypothetically, increase response rates by creating a sense of collegiality between researcher and respondent in the survey process, this possibility has received little attention in the literature. May (9) combined such a promise with an appeal for help, but his results were inconclusive and not fully analyzed.

The diversity and disparity of the findings of these studies, no doubt partly the result of differences in conception and design and differences in the populations surveyed, make it unclear to what extent they are representative and generalizable. It is also unclear to what extent these studies—all dealing with household surveys or surveys of individuals—are relevant to the problem of response rates to surveys of hospitals. These are in many ways a special case of mail

surveys. Such surveys are designed to obtain information about the institutions to which they are sent, rather than about the people who complete them. Thus, response or nonresponse may result not merely from the decision of a person, but from the decision of a group, and may additionally be conditioned by corporate policy. It seems likely that the factors that determine response rates to mail surveys operate differently than they do in surveys of people.

Methods

We used the AHA's 1980 Selected Topics Survey, the eighth in an annual series. Each year the survey, sent to all U.S. community hospitals registered with the AHA, asks from 8 to 12 questions about hospital topics of current interest; although some topics are covered repeatedly, the questions generally are new each year. The 1980 survey was sent to 5,842 hospitals, addressed to the chief executive officer (CEO). It asked about the process of corporate planning, risk management programs, expenditures for hospital supplies, representation in collective bargaining, work stoppages, admitting privileges of physicians, qualifications of dietitians, ambulatory care billings, support groups to assist in followup care, programs of special services for the elderly, and audiovisual equipment.

A 4-factor, 16-cell experimental design was employed. The 16 survey instruments represented all possible combinations of the 4 following dichotomous variables:

1. Perceived length of the questionnaire: (a) 1-page front-and-back continuous form, 8½" × 14" and (b) 4-page booklet, 8½" × 11".
2. Order of questions: (a) questionnaires began with questions about the topics assumed to be of greatest saliency and relevance to the main purposes and operations of the hospital (corporate planning and risk management) and ended with those of the least (audiovisual equipment) and (b) questionnaires followed the reverse order.
3. Orientation of the appeal made in the cover letter, addressed to the chief executive officer: (a) impersonal in tone; stressed the value of the survey to the hospital industry in general and (b) personal in tone; used the second-person pronoun to refer to the respondent and the first-person plural pronoun to refer to the solicitor; stressed the value of the survey to the CEO's institution and profession.
4. Cover letter; promise of results: (a) promise present and (b) promise absent.

The 5,842 hospitals were divided into 16 experimental groups; each group received 1 of the 16 survey instruments. To control for the effects of the hospitals'

Table 1. Response rates for each of 16 experimental groups in a mail survey of community hospitals

Questionnaire format and order of questions	Orientation of cover letter	Promise of results	Experimental group	Number in cells ¹	Overall response rate (percent)	Response rate to first mailing (percent)
<i>Booklet</i>						
Most salient and relevant first	CEO ² and institution	{ Present	1	371	70.9	51.8
		{ Absent	2	367	68.1	50.1
	Hospital industry	{ Present	3	369	70.5	48.2
		{ Absent	4	366	66.9	43.4
Most salient and relevant last	CEO and institution	{ Present	5	366	64.2	41.8
		{ Absent	6	365	67.1	46.6
	Hospital industry	{ Present	7	355	69.3	50.1
		{ Absent	8	363	64.5	45.7
<i>Continuous form</i>						
Most salient and relevant first	CEO and institution	{ Present	9	360	74.4	54.4
		{ Absent	10	369	72.3	52.8
	Hospital industry	{ Present	11	365	76.4	59.5
		{ Absent	12	361	74.5	54.0
Most salient and relevant last	CEO and institution	{ Present	13	360	68.3	47.2
		{ Absent	14	358	67.0	44.7
	Hospital industry	{ Present	15	360	70.3	45.6
		{ Absent	16	362	69.1	43.6
Total				5,817	69.6	48.6

¹ Cells differ slightly in size because the study was originally designed with cells of approximately 365 hospitals, each representing one-sixteenth of the 5,842 community hospitals existing at the end of 1975. During the course of the study, the American Hospital Association learned that some

of these hospitals had closed or merged, while new ones had opened. The former were dropped from the cells, and the latter were randomly allocated among them.

² CEO indicates chief executive officer.

institutional characteristics on response rates, the multiple logistic technique described by Mullner and associates (1) was used to predict the hospitals' relative probability of response from their combinations of institutional characteristics. Hospitals were ranked according to their predicted probability of response and were divided into groups of 16. The 16 hospitals within each of these groups were then allocated by randomization to the 16 experimental groups.

One month after the first mailing, nonresponders were sent a second copy of the survey instrument, identical to the one they had received earlier except for notification that it was a second mailing.

Results

Overall response rates and response rates to the first mailing are shown for each of the 16 experimental groups in table 1. The total overall response rate to the survey was 69.6 percent, ranging from 64.2 percent to 76.4 percent among the 16 groups. The total response rate to the first mailing was 48.6 percent, ranging from 41.8 percent to 57.5 percent among the groups. The pattern of variance in response to the first

mailing tended to parallel that to the survey as a whole (product moment correlation: $r = 0.88$).

Marginal overall response rates and marginal response rates to the first mailing are shown for each of the four dichotomous variables in table 2. Again, the patterns of the latter parallel those of the former. As the table indicates, only two of the four variables show significant variations in response rates. One of these is the order of questions: the questionnaires that began with questions about the topics of greatest saliency and relevance to the main purposes and operations of the hospitals achieved an overall response rate of 71.72 percent, while those that began with questions about topics of least saliency and relevance achieved an overall response rate of 67.46 percent ($P < .001$). The other is the perceived length of the questionnaire: the 1-page 8½" × 14" continuous form achieved an overall response rate of 71.52 percent, while the 4-page 8½" × 11" booklets achieved an overall response rate of 67.69 percent ($P < .001$). Neither of the cover letter variables show significant variations in response rates.

To further analyze the significance of each of the four survey instrument variables as determinants of

Table 2. Marginal response rates for each of four survey instrument variables, mail survey of community hospitals

Variable	Overall response rate (percent)	Response to first mailing (percent)
Order of questions:		
Most salient and relevant first	¹ 71.76	¹ 51.5
Most salient and relevant last	67.46	45.7
Questionnaire format:		
Booklet	67.69	47.2
Continuous	¹ 71.52	² 50.0
Orientation of cover letter:		
Hospital industry	69.07	48.5
Chief executive officer and institution	70.18	48.7
Promise of results:		
Present	70.54	49.6
Absent	68.74	47.6

¹ $P < .001$. ² $P < .01$.

response, while controlling for confounding by the other survey instrument variables, we used the LOGIST program in the SAS Supplemental Library (10), fitting our data to the multiple logistic regression model given by the equation

$$Y = \frac{\exp(b_0 + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5Z)}{1 + \exp(b_0 + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5Z)}$$

where,

$Y = 1$ if hospital responded to the survey, and 0 if otherwise,

$X_1 = 1$ if the most salient and relevant questions appeared first in the questionnaire, and 0 if last,

$X_2 = 1$ if a continuous form was used, and 0 if a booklet was used,

$X_3 = 1$ if a promise of results was made in the cover letter, and 0 if not,

$X_4 = 1$ if the orientation of the cover letter was toward the CEO and his particular institution, and 0 if toward the hospital industry as a whole, and

$Z =$ the logistic response probability determined on the basis of institutional characteristics of the hospital by means of the technique described by Mullner and associates (1).

We investigated the significance of the association between each of the four survey instrument variables and response rates by examining each of the regression coefficients $b_1, \dots, b_4$ divided by its estimated standard error. This analysis was carried out by using both overall response rates and response rates to the first mailing as the dichotomous dependent variable.

The results of the multiple logistic regression analysis are shown in table 3. The findings mirror those of the

analysis of the preceding marginal response rates: for both the overall response and the response to the first mailing, significant regression coefficients were found for the order of questions and for perceived questionnaire length but not for the orientation of the appeal made in the cover letter nor for the promise of results to respondents.

Regression coefficients for a more complete model including two- and three-way interactions between the five variables indicated in the preceding equation were also estimated. However, no significant interactions were found, either for overall response or for response to the first mailing.

Discussion and Conclusion

To summarize, the results of our experiment with a survey of institutions indicate that the order of questions and the perceived length of the questionnaire significantly affect response rates, while the orientation of the appeal made in the cover letter and the inclusion in it of a promise to share the results of the study with respondents do not. As is inevitably the case, however, the particular context and circumstances in which the study was conducted make the question of its generalizability difficult to answer at certain points.

Ferber (5) noted with some surprise that bias due to question order, frequent in personal interview surveys, is likely in mail surveys as well, even though in mail surveys the respondent can inspect the entire questionnaire before answering any question and does not have to answer the questions in the order in which they appear. It was our hypothesis that question order can also affect response rates to mail surveys, and that questionnaires beginning with the most salient and relevant topics would achieve higher response rates than questionnaires following a reverse order. Our results seem clearly and unambiguously to confirm this hypothesis.

We also hypothesized that the continuous form would be perceived as shorter than the booklet and would therefore receive a higher rate of response. Again, our hypothesis seems to have been confirmed. However, it should be noted that all hospital CEOs were familiar with this particular survey, and that the continuous form was the one used in earlier years. It is therefore possible that hospital CEOs responded more readily to the continuous form as the one most familiar to them. Nevertheless, we do not consider it likely that familiarity or novelty were significant factors since all hospitals receive several surveys from the AHA each year, some of which are in the continuous and some of which are in the booklet form.

Table 3. Estimated multiple logistic regression coefficients for the four survey instrument variables, mail survey of community hospitals

Variable	Overall response as dependent variable		Response to first mailing as dependent variable	
	Regression coefficient	Significance of regression coefficient (P value)	Regression coefficient	Significance of regression coefficient (P value)
Constant term (b_0)	-.3750	.0016	-.8203	< .0001
Order of questions (b_1)	.2074	.0003	.2378	< .0001
Questionnaire format (b_2)	.1875	.0011	.1135	.0315
Promise of results (b_3)	.0866	.1328	.0773	.1431
Orientation of cover letter (b_4)	.0518	.3686	-.0077	.8843
Logistic response probability score based on institutional characteristics (b_5)	.00000181	< .0001	.00000104	< .0001

The familiarity of hospitals with AHA surveys does, however, cast some doubt upon our findings about the lack of effect of the orientation of the appeal made in the cover letter and the inclusion of a promise to send the results of the survey to the respondents. It is possible that the CEOs felt that they already understood the content and purpose of the survey and therefore paid little heed to the cover letter and its contents, and that the results might have been different had the survey been a new one. It was of course impossible to control for this possibility. More research is clearly needed.

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SYNOPSIS

MULLNER, ROSS M. (American Hospital Association), LEVY, PAUL S., BYRE, CALVIN S., and MATTHEWS, DALE: *Effects of characteristics of the survey instrument on response rates to a mail survey of community hospitals. Public Health Reports, Vol. 97, September-October 1982, pp. 465-469.*

A 4-factor, 16-cell experimental design was used to investigate the relationship between response rates of community hospitals to a survey conducted by the American Hospital Association (AHA) and 4 characteristics of the survey instrument, each

varied dichotomously: the perceived length of the questionnaire, the order of questions, the orientation of the appeal made in the cover letter, and the presence or absence of a promise to share the results of the study with respondents.

Response rate variations between the various cells were examined and multiple logistic regression was used to analyze the significance of the association between response rates and each of the four survey instrument variables while controlling for the effect of the others. At the same time, control was also maintained for

the effects of five institutional characteristics of hospitals which a previous study had shown to have a significant relationship to response: bed size, location within or outside a standard metropolitan statistical area, AHA membership status, type of ownership, and form of control.

The perceived length of the questionnaire and the order of questions were found to have a significant effect on response rates, but the orientation of the cover letter and a promise to share the results of the study with the respondents were found to be insignificant.

Three-Dimensional Computer Mapping of Disease in Los Angeles County

KENNETH P. SATIN, DrPH
RALPH R. FRERICHS, DVM, DrPH
ELIZABETH M. SLOSS, MPH

A FUNDAMENTAL PREMISE OF EPIDEMIOLOGY is that disease is not randomly distributed in a population. Therefore epidemiologic studies are often conducted to ascertain the distribution and frequency of disease within a population. In such studies attention is routinely focused on determining which subgroup is affected and where and when the disease is occurring. Study of this trilogy of factors, commonly referred to as person, place, and time, can be a useful way of discovering the health profile of a community.

Dr. Satin, now an epidemiologist, California Department of Health Services, Berkeley, at the time of the study was a graduate student in the Division of Epidemiology, University of California at Los Angeles. Dr. Frerichs is associate professor of epidemiology, UCLA School of Public Health, Los Angeles, Calif. 90024. Ms. Sloss is a graduate student in the Division of Epidemiology, UCLA. The study was funded by the Sanitation Districts of Los Angeles County (CSD No. 2402) and by the U.S. Environmental Protection Agency (EPA No. R806399010). Tearsheet requests to Dr. Frerichs.

The frequency of a disease may be related to geographic location, that is, to the specific environmental characteristics of a region. These environmental characteristics may be of natural origin, like the fungus *Coccidioides immitis* which causes San Joaquin Valley fever in the population of arid regions of the southwestern United States. Or they may arise because of the actions of man, as did the air pollution in London that was responsible in 1952 for an increase in deaths related to respiratory impairment (1,2). Countless other diseases are also known to be related to the environment.

Because the geographic distribution of a disease may stimulate hypotheses regarding its etiology, medical geographers and epidemiologists have commonly displayed disease patterns in maps. For example, in the outbreak of cholera in London in 1848-54, John Snow mapped the exact location of those who died of cholera, noting that the sites were clustered around the

Broad Street water pump and thus were related to the water supply (3). Since then, maps have often been used to display epidemiologic data—usually mortality or morbidity rates—for the geographic areas of interest. On a shaded map of Pittsburgh, Patno (4) showed the prevalence of cancer in that city in 1947. Greenburg (5) presented 1959-61 mortality rates on a map of 10 subareas of Staten Island, New York. Chapman and Coulson (6) prepared colored maps showing the 1966 mortality patterns in Los Angeles County by census tract for infant deaths, total mortality, and mortality from cancer, ischemic heart disease, stroke, and accidents.

More recently, Mason and McKay (7) have published the results of one of the largest studies of disease occurrence by geographic area. The maps for the study, showing the cancer mortality rates for each county in the United States ($N = 3,056$), were produced by an automated cartographic (computer mapping) system. With these data,

many investigators have arrived at new hypotheses about the etiology of certain cancers (8-10).

Two-dimensional maps such as those mentioned in the preceding paragraphs are often difficult to interpret and summarize, however, because they contain numerous subareas of multiple colors or patterns. We describe here a computer technique for displaying spatial data on disease frequency that minimizes these difficulties by the introduction of a third dimension to maps.

Methods

Preparation of data for mapping. The data to be mapped were obtained from computer files of vital statistics records for Los Angeles County (LAC) for 1969-71 and from the second-count data computer tapes of the 1970 U.S. Census of the Population for LAC. Two measures of health outcome were analyzed: death from all causes and morbidity related to

potential waterborne diseases. These diseases were selected from the list of notifiable diseases reported to the Los Angeles County Health Department and include infectious hepatitis, shigellosis, meningitis of undetermined etiology, typhoid, salmonellosis, amebiasis, meningococcal infections, meningitis of etiology other than mumps, and leptospirosis. These measures of health outcome were selected to coincide with those used in the analyses of a larger study being conducted in Los Angeles County to assess the impact on human health of consumption of reclaimed wastewater (11). These broad health outcome measures were used because in the absence of a complete inventory of waterborne contaminants, hypotheses regarding specific health effects are difficult to formulate.

The smallest geographic unit for which both vital statistics data and census data are coded is the census tract. Since the vital statistics data had been coded with 1960 census tract codes and the 1970 popula-

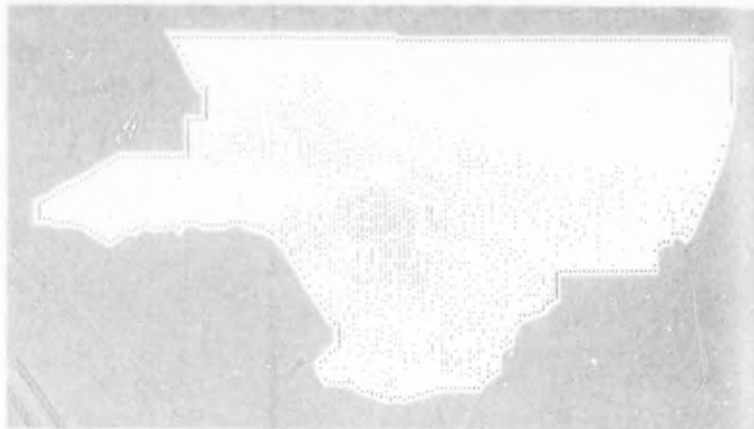
tion data were available only by 1970 census tracts, the census tract unit had to be modified to account for the changes in census tract boundaries between the 1960 and 1970 censuses. To link the 1960 and 1970 census tracts so that the health data and the census data would relate to the same geographic area, a "correspondence tract" was formed that maintained the same geographic boundary for both census periods. Thus, in Los Angeles County, 1,159 correspondence tracts linked the 1,297 census tracts of 1960 to the 1,576 census tracts of 1970.

Measurement of morbidity and mortality. Our analysis of the pattern of disease in Los Angeles County was based on a standardized mortality ratio (SMR) for each correspondence tract. Similarly, a standardized morbidity ratio (SMR) was used in analyzing the LAC waterborne disease distribution. The SMR is the ratio of the observed number of events in an

area (determined from the vital statistics records) divided by the expected number of events in the same area. To obtain the expected number of events, the rate of the condition of interest as observed in a standard population is applied to the population of the local area. For example, in the analyses we performed, the standard population comprised residents of Los Angeles County in 1970, and the local population consisted of the residents of each correspondence tract. If an SMR was equal to 1.0, the local area was experiencing the same number of events as would be expected, given the average rates for the standard area. If an SMR was less than 1.0, fewer events were occurring than expected. If an SMR was greater than 1.0, more events were occurring in the local area than would be expected based on the experience of the county as a whole. An advantage of using the SMR rather than a crude disease or mortality rate is that the SMR can always be viewed in terms of its reference value, 1.0. Thus, regardless of the absolute disease rate, the health experience of the local area can be compared with a reference area by noting the deviation of the SMR from unity.

To determine if the observed number of events differed significantly from the expected number (that is, if the SMR for each tract differed from 1.0), we assumed that the observed number of deaths in a given tract followed a Poisson distribution with a mean equal to the expected number of deaths. The standardized ratio was tested against the hypothesized value of 1.0 (no difference from the standard) by using the Poisson distribution for small numbers of observed deaths—less than 10—and the standard normal distribution for observed deaths of 10 or more (12). For a small number of events, the

Figure 1. Centroids of census tracts in Los Angeles County, 1970



probability that the observed results were due to chance was estimated from a Poisson distribution by using the following formula for the probability that a particular value, X , would occur:

$$P(X) = \frac{e^{-\mu} \mu^x}{X!}$$

where μ = the expected number of events. For 10 or more events, the normal approximation to the distribution was used. We derived the probability that the observed results were due to chance from the normal distribution, using the standard normal deviate (z) given by Armitage (12),

$$z = \frac{O - E}{\sqrt{E}}$$

where O is the observed number of events and E the expected number. The choice of 10 events as a cutpoint is arbitrary, although in accord with the procedure followed by Haenszel and associates (13). In addition, for the mapping procedure, tracts with less than 1.0 expected events were assigned an SMR of 0.0 because it was assumed that a small number of events would result in unstable and potentially large or misleading ratios. Tracts with no observed events were also assigned the value 0.0 for their SMR.

Computer mapping procedure. We used the SYMAP and ASPX computer programs developed by the Laboratory for Computer

Figure 2. Geographic orientation to three-dimensional view of Los Angeles County

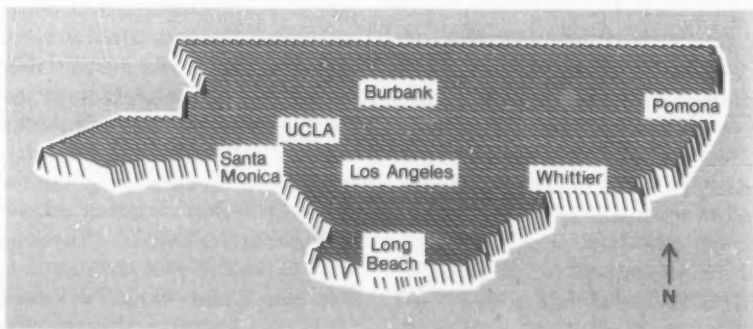
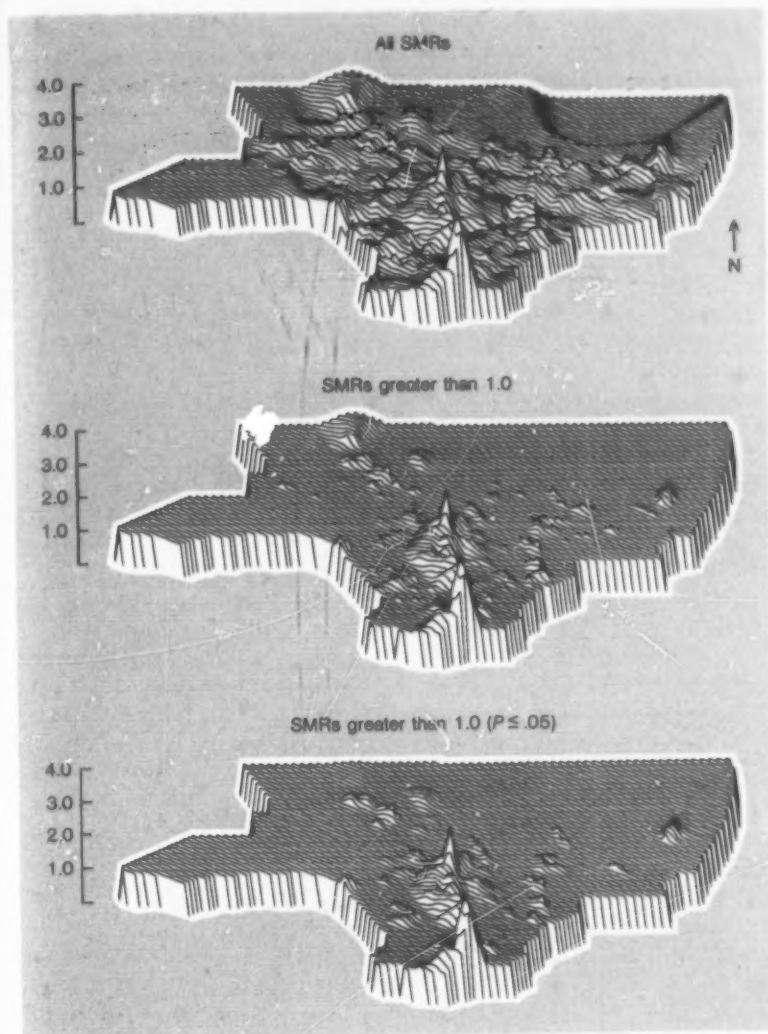


Figure 3. Age- and sex-standardized mortality ratios (SMRs) for all causes of death, Los Angeles County, 1969-71



Graphics and Spatial Analysis, Graduate School of Design, Harvard University, to produce three-dimensional maps for the SMRs. The SYMAP program was used first to assign geographic coordinates to the raw data, in this case a standardized ratio corresponding to the centroids of the census tracts in LAC. For the SYMAP program, both the geographic coordinates that represent the outline of the study area and the centroids of the basic geographic unit are needed.

In some instances, a computer file containing the coordinates can be purchased from private purveyors. In general, however, the set of coordinates can be determined by tracing an outline of the study area onto a rectangular grid labeled with Cartesian coordinates, from which the outline and centroid points can be directly identified. These coordinates are then entered into the SYMAP program.

Since the correspondence tract was the geographic unit used in

our analysis, all census tracts within a given correspondence tract were assigned the same SMR. For each set of data points, SYMAP automatically interpolated between centroids so that a continuous surface would be obtained. The program was then used to create a computer file containing a matrix of geographic coordinates along with the corresponding value for the "height" (interpolated standardized ratio) to be plotted at each location. This file served as the input file for the ASPEX program with which the three-dimensional maps were produced. The ASPEX program was run interactively on an IBM 3033 computer with a Tektronix 4081 cathode ray tube terminal.

For each disease condition of interest, a series of three maps was prepared. The top map in the series shows the SMRs for each correspondence tract in Los Angeles County. The peaks represent SMRs greater than 1.0; valleys, SMRs less than 1.0; and flat planes, SMRs of 1.0. The middle map shows those areas with SMRs greater than 1.0, a value indicating there were more deaths than expected. In this map and the bottom one, tracts with SMRs of less than 1.0 had their SMR set at 1.0 to provide a reference plane that would facilitate evaluation of the magnitude of the surrounding ratios. The bottom map shows only census tracts with SMRs greater than 1.0 at the 0.05 level of statistical significance.

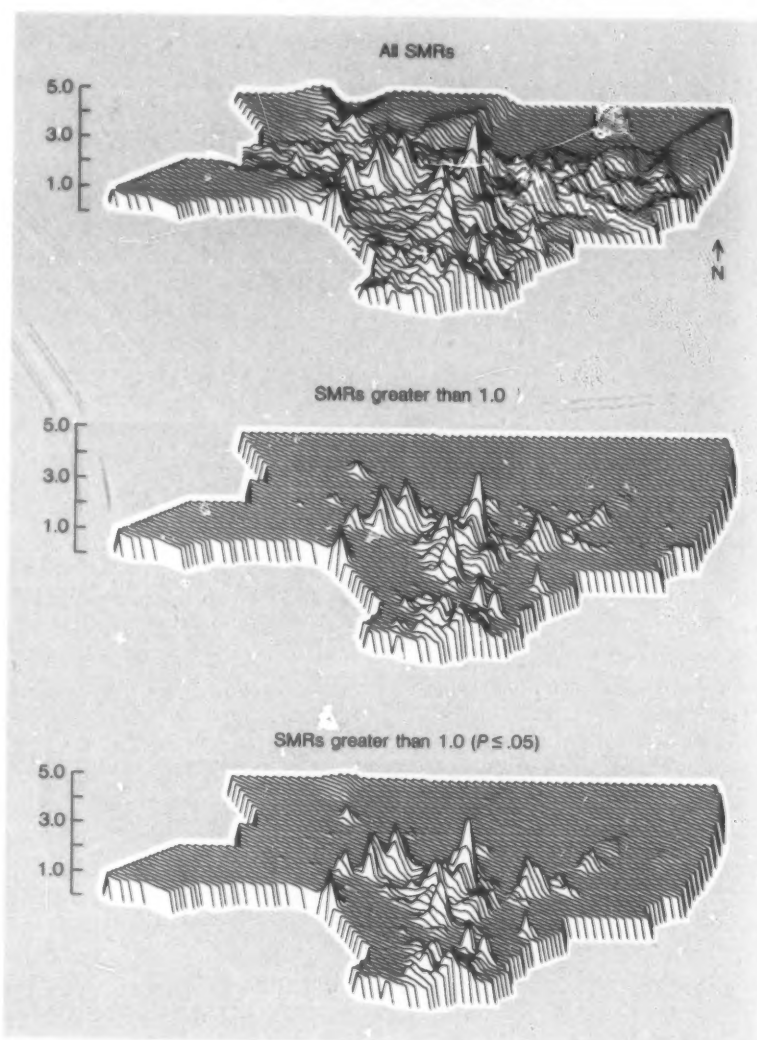
Results

Reference maps of Los Angeles County (figs. 1 and 2) are presented to aid in the interpretation of the analysis. Figure 1, a two-dimensional map, illustrates the location of the centroids of the census tracts in the county, based on the 1970 U.S. Census. Approximately 5,000 people live in each tract; thus,

a high density of census tract centroid markers in a given area implies a relatively large population. The sparse population of the western peninsula and along the northern border of LAC is reflected in the diminished density of census tracts in those areas. Figure 1 also suggests that census tracts in these areas tend to be geographically large. As a consequence, a three-dimensional plot of the SMR for each tract in these areas will appear as a broad plane or as a gradually sloping hill or valley, depending on the value of the SMR. The most densely populated area of LAC is the central region; somewhat smaller population centers are located northwest, east, and south of this central region. In the central region, each census tract covers a relatively small area; hence, its SMR will appear as a sharp peak or valley on the three-dimensional map. Figure 2 serves as a reference to the approximate location of some large cities in LAC as they would appear in the three-dimensional orientation used in our analyses.

Deaths from all causes. The geographic distribution of deaths from all causes is shown in figure 3. The top map indicates that there is considerable variation in this distribution throughout the county. Along the northern and western borders, the SMRs tend to be 1.0 or less in the central portion, small positive and negative deviations from the expected number of deaths can be seen. However, large peaks in the downtown regions of Los Angeles and Long Beach indicate much higher zones of excess mortality as compared with the rest of the county. In these areas, the mortality experience is about three times greater than expected. Looking at the center map, we see that a zone of excess mortality from all causes of death extends from Los

Figure 4. Age- and sex-standardized morbidity ratios (SMRs) for potential waterborne diseases, Los Angeles County, 1969-71



Angeles south to Long Beach. The bottom map in the figure shows that with statistical criteria as the basis, mortality is significantly greater than expected.

Potential waterborne diseases. All the potential waterborne diseases selected for this analysis were combined, and a single standardized ratio was calculated for each correspondence tract. The geographic pattern of morbidity in the county from these diseases is shown in fig-

ure 4. Considerable variation in morbidity is apparent within the densely populated areas, that is, in the central and southern parts of the county. There are zones of excess morbidity from the central area south to Long Beach as well as in communities in the eastern part of the county. The bottom map in the figure reveals that the statistically significant excess morbidity in some correspondence tracts is almost five times that expected based on the entire county as the standard.

Discussion

Three-dimensional maps (figs. 3 and 4) demonstrate the patterns of excess mortality from all causes of death and of morbidity attributable to potential waterborne diseases in Los Angeles County in the period 1969-71. Although mortality and morbidity varied considerably throughout the county, the maps demonstrate that several areas experienced significantly higher rates of mortality and morbidity than the county. The zone of excess mortality from all causes in the central corridor includes the skid row areas of Los Angeles and Long Beach as well as the socioeconomically depressed area of Watts. Socioeconomic conditions may explain why the mortality ratios for these areas were relatively high. Three-dimensional maps can be useful in revealing not only the health status of a community but also can serve as a means of generating hypotheses regarding which population characteristics or environmental conditions may be responsible for the geographic distribution of disease in a community.

The method of indirect adjustment of mortality employed in this investigation has been used previously in studies of spatial patterns of mortality. Howe published atlases of the United Kingdom in 1963 (14) and 1970 (15) that displayed standardized mortality ratios as patterns on two-dimensional maps. Chapman and Coulson (6) produced several maps of Los Angeles showing SMRs in 1966 by community; they used multiple colors (printed as varied shades in black and white reproductions) on each two-dimensional map to indicate the size of the SMR. Calle (16) mapped cancer mortality in Columbus, Ohio, by census tract, indicating by patterns on a two-dimensional map those SMRs that

were significantly higher or lower than 1.0.

Computer mapping is especially appropriate for analysis of disease patterns in small areas. Interpretation of a two-dimensional map with multiple patterns, however, requires the reader to remember a color or pattern key. To summarize the entire map or to compare areas on it is often difficult. These problems of interpretation are eliminated when a three-dimensional mapping routine is used to represent the data on disease frequency. Since three-dimensional maps show the data in a continuous fashion, these data need not be categorized. The value at a given location on the map is represented as a peak whose height is proportional to the magnitude of the ratio. Thus, three-dimensional maps can summarize large amounts of data, as well as provide an immediate visual impression of the relative magnitude and distribution of disease throughout an area.

Although computer mapping routines have not been used extensively either in the health field in general or in epidemiologic research in particular, the advances in the last two decades in computer graphics have provided systems that can be easily used by nontechnical personnel. Computer mapping provides a relatively inexpensive and simple method of displaying spatial data, which is consistently accurate when used with multiple data sets. An added advantage is that reproduction-ready copies can be made in a matter of minutes.

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South Carolina's Suicide Mortality in the 1970s

Findings in this analysis support previously noted differences between the Southeast and the nation in the statistics concerning suicide.

GREG R. ALEXANDER, MPH
TYSON GIBBS, PhD
RONNIE M. MASSEY, MD, MPH
JOAN M. ALTEKRUSE, MD, DrPH

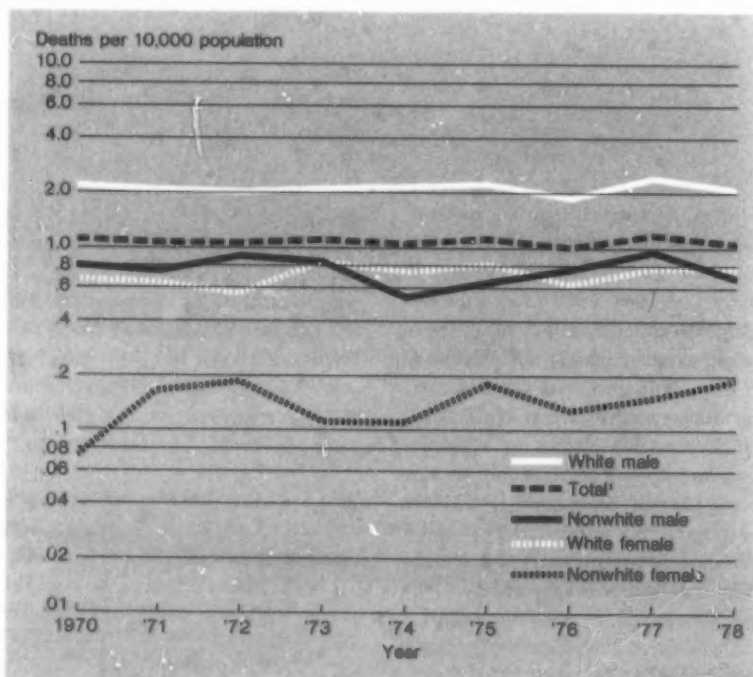
THE EVALUATION OF VITAL RECORDS was one of the earliest techniques employed in the study of suicide and has proved to be one of the most durable. Although vital statistics may have only limited value in interpreting the sociology of suicide or in understanding the psychology of its victims, these statistics nonetheless continue to provide useful information on the epidemiology of suicide in particular societies (1).

In the United States, statistics on suicide, like other official causes of death, are compiled from the underlying causes of death reported on death certificates. Although subject to the same errors in recording, interpretation, and coding as are most fatal processes, suicide and the other external causes of death, such as homicide and accidents, are vulnerable to additional sources of error. Reporting errors stem in part from the Western cul-

tural ethic against death by suicide and the societal sanctions against it. Consequently, suicide deaths may be hidden, obscured, or simply go unrecognized as attributable to that cause. The resulting underestima-

tion has been well documented (2-5). A further consequence, and a necessary one, is that society itself intrudes directly—through the active involvement of the coroner or the medical examiner system—

Figure 1. Yearly suicide death rates of South Carolina residents, by race and sex, 1970-78



*Total directly adjusted for age, race, and sex to 1970 South Carolina population.

The authors are with the Department of Preventive Medicine and Community Health, School of Medicine, University of South Carolina, Columbia, S.C. 29208. Mr. Alexander is a biostatistician, Dr. Gibbs and Dr. Massey are assistant professors, and Dr. Altekruze is a professor. Tearsheet requests to Mr. Alexander.

on the certification of the death process.

Although the fact of death and the biological mechanism of death are generally certified by a clinical physician or a medical examiner, a nonprofessional public official, the coroner, may also assume this function in many States including South Carolina. The coroner or medical examiner, depending on the local government's regulations, has the additional duty of determining the legal classification of a death. That is, he or she must determine if a death is attributable to accident, homicide, suicide, or some other cause. The category to which a death is assigned depends on a number of variables including the evidence around the body, the statements of relatives, friends, and witnesses, the environment in which the death occurred, and the personality, experience, and expertise of the person required to make the judgment.

The presumption of innocence in the legal system of the United States, as well as the moral and legal stigmas attached to suicide, make the determination of death

by suicide a decision that must be proved by evidence, rather than presumed from circumstance (2). For the most part, deaths that are reported as suicides are generally those that could be attributed only to that cause. The legal system itself, therefore, assures that vital records will underestimate the true incidence of suicide. The system further assures that deaths that are so recorded are those of people believed likely to commit suicide and that result from methods believed associated with suicide, for example, prisoners who hang themselves.

Obviously, the qualifications of the person required to make the determination may influence his or her likelihood of categorizing a specific death as suicide. It is conceivable, therefore, that an untrained, inexperienced, elected coroner without the support of a forensic pathologist might make a determination different from that of a trained, appointed medical examiner. Insofar as the personal characteristics of the official affect his or her judgment, the determination may be further biased. Be-

cause of these factors, vital statistics data on suicide death rates are biased underestimates that are subject to unintentional but direct influence by the structure and officials of the local government.

Despite problems inherent in these data, statistical data on suicides yield information analogous to that obtained from reports of infectious disease. They cannot provide information on the process that leads to suicide or highly accurate epidemiologic information on the incidence of completed suicides, but the statistics nonetheless serve an important function as an indicator of the magnitude of the problem in our society.

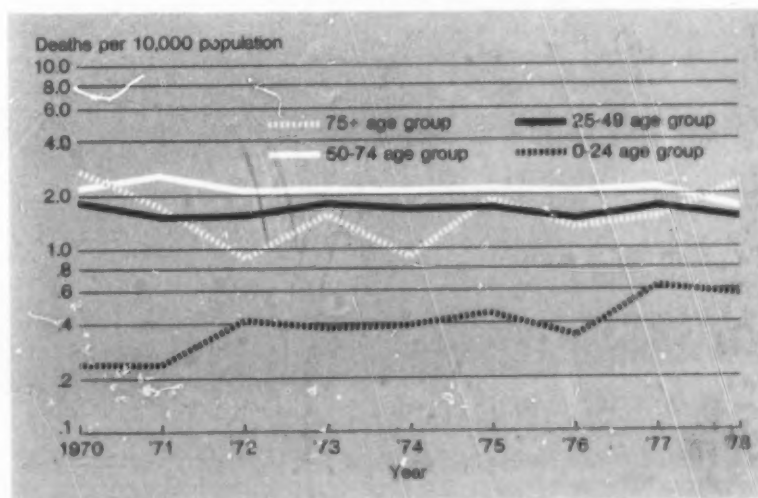
Believing this consideration to be relevant, we decided to review the vital records of South Carolina for the 9-year period 1970-78 to examine the distribution of suicides over time and within various groups as one part in a larger descriptive study of the epidemiology of all external causes of death in the State. During the period of study, South Carolina began an era of rapid industrialization and population growth. We believed, therefore, that the information on suicide for this interval might be of more than usual sociological interest.

Because the State lacked a uniform coroner or medical examiner system, we also hoped that effects of the different death certification processes might be discerned in the data.

Methods

The source of data for this study was the Resident Death File for 1970-78, provided by the Office of Vital Records and Public Health Statistics, South Carolina Department of Health and Environmental Control. Deaths recorded as suicides were identified as all cases having as underlying cause of death

Figure 2. Yearly suicide death rates of South Carolina residents, by 25-year age groups, 1970-78



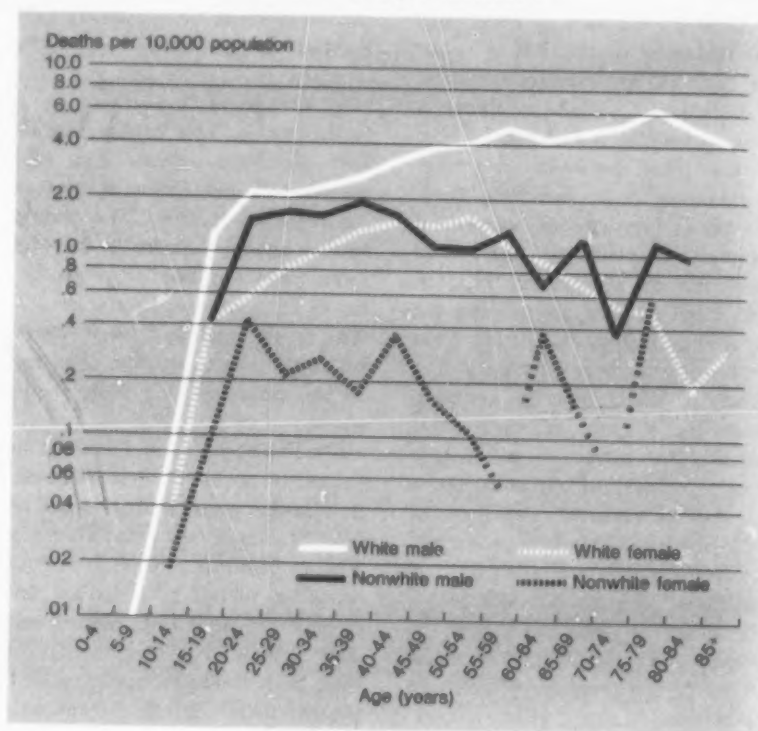
the Eighth Revision ICDA code of E950-E959 (6).

Because of rapid changes in the distribution of South Carolina's population over the study period, as well as geographic variation in the State's demographic characteristics, suicide mortality rates were adjusted to remove bias attributable to demographic variability. The adjusted rates displayed were calculated by the direct method; the 1970 South Carolina population was the standard. All rates were calculated per 10,000 population rather than by using the conventional population size reference of 100,000. Since 40 of 46 South Carolina counties had populations less than 100,000 in 1975, the smaller reference value is believed to yield results which are more comprehensible in terms of the number of deaths actually experienced. Population estimates for rate calculations were obtained from the South Carolina Division of Research and Statistical Services. Statistical significance testing, primarily linear regression analysis, Poisson and chi-square, were not corrected for multiple comparisons.

Results

During the 9-year period, 2,763 suicides were recorded for South Carolina residents. The yearly age-, race-, and sex-adjusted suicide rates

Figure 3. Average annual suicide death rates of South Carolina residents, by age, according to race and sex groups, 1970-78



remained fairly constant throughout the study period; a high rate of 1.17 was observed in 1977 (table 1). In comparison with national data, the annual, unadjusted suicide rates for South Carolina were slightly below those for the United States during the period. The national rates were 1.15 in 1970 and 1.27 in 1975 (7) compared with

the South Carolina rates of 1.10 in 1970 and 1.16 in 1975.

White males had, as expected, the highest suicide rates, and nonwhite females, the lowest rates. Detailed in table 1, the unadjusted or crude annual rates for whites were approximately three times the nonwhite rates, and the rates for males were similarly three times that for

Table 1. Crude and age-race-sex adjusted suicide rates by years, race, and sex, South Carolina residents, 1970-78

Year	Total numbers (N = 2,763)	Total crude rate (N = 2,763)	Total age-race-sex adjusted rate ¹ (N = 2,763)	White crude rate (N = 2,426)	Nonwhite crude rate (N = 337)	Male crude rate (N = 2,093)	Female crude rate (N = 670)	White male crude rate (N = 1,814)	White female crude rate (N = 612)	Nonwhite male crude rate (N = 279)	Nonwhite female crude rate (N = 58)
1970	285	1.10	1.10	1.40	0.41	1.75	0.47	2.15	0.65	0.79	0.07
1971	282	1.07	1.06	1.36	0.42	1.65	0.50	2.06	0.66	0.69	0.16
1972	281	1.05	1.03	1.29	0.51	1.68	0.44	2.04	0.56	0.86	0.18
1973	308	1.13	1.11	1.44	0.45	1.70	0.59	2.08	0.81	0.81	0.11
1974	303	1.09	1.07	1.45	0.31	1.68	0.53	2.19	0.73	0.53	0.11
1975	328	1.16	1.13	1.51	0.40	1.76	0.59	2.26	0.79	0.64	0.18
1976	285	1.00	0.96	1.27	0.42	1.56	0.46	1.93	0.62	0.74	0.13
1977	359	1.25	1.17	1.58	0.53	1.95	0.58	2.40	0.78	0.94	0.15
1978	332	1.14	1.08	1.46	0.45	1.73	0.56	2.18	0.76	0.74	0.19

¹ Directly adjusted to 1970 South Carolina population.

females. In previous studies of national data or data from specific localized areas, researchers reported comparable male to female ratios for suicide rates (2-4,8,9).

The annual unadjusted suicide rates for South Carolina white females roughly approximated the national rates, but the State rate for white males was slightly in excess of the national average. The rates for nonwhite South Carolinians of both sexes were below the national rates for the time period. The national rates for nonwhite females were two to three times greater than those for the State (7). However, the State rate for this group appeared to increase over time, although the rise is not statistically significant (fig. 1).

The increasing proportion of suicides in the younger age groups observed in the 1970s in South Carolina was consistent with national trends (10). Figure 2 depicts rates of suicide deaths by year for 25-year age groups. Although the rates for the age group 50-74 years decreased significantly ($P <$

.05), the rates for the age group 0-24 years increased significantly ($P < .05$). Between 1970 and 1978 suicides rose from the fourth to the second leading cause of death in 15- to 24-year-olds in South Carolina. This change reflects an increase for this age group in the proportion of all deaths attributed to suicide from 4.1 percent in 1970 to 10.4 percent in 1978 (11,12).

Average annual suicide rates by age for race-sex groups are shown in figure 3. The rate for white males, the highest, exhibited a fairly steady increase up to late in the eighth decade of life (6.0 maximum rate). The rate for nonwhite males peaked at 1.8 in the late thirties and then declined. A more gradual increase in the rate for white females occurred, reaching 1.6, its highest point, in the 50-54 age group. The absence or small number of suicides of nonwhite females in the different age groups precludes the identification of a definite trend in suicide mortality rates by age. Although a general increase occurred in the average

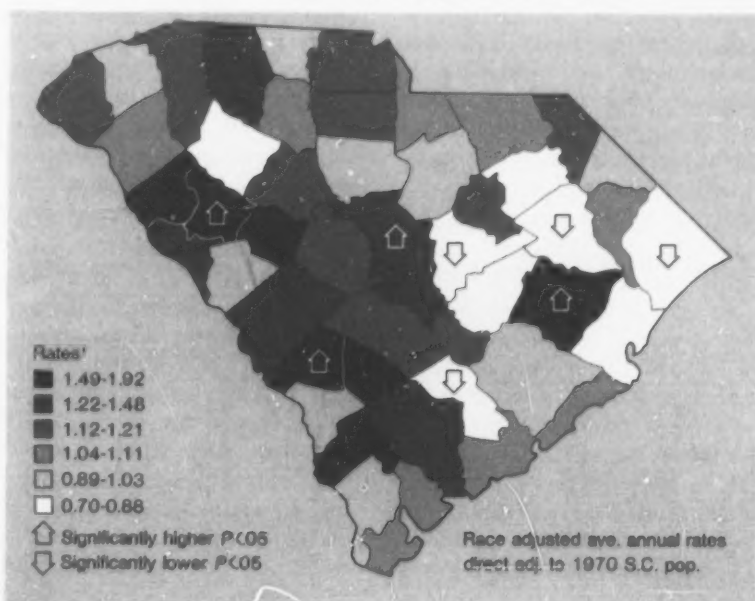
annual rates, the general pattern of rates by age for race-sex groups shown in figure 3 remains strikingly similar to comparable regional data of 25 years ago (13).

Race-adjusted average annual suicide rates were mapped by county (fig. 4). The 7 counties with the highest rates are all predominantly rural, and 6 of these counties are located within 50 miles of the Savannah River along the western border of the State. With the one exception, the counties in the northeastern portion of the State have relatively low suicide rates.

A frequency distribution of race-adjusted county suicide rates is presented in figure 5. The distribution is skewed toward the higher rate tail. An analysis of the observed to the expected mortality rate for each county, based upon the ratio of a Poisson variable to its expectation (14), indicates that at the 95 percent confidence level the observed ratio was significantly different for eight counties: four were higher than expected, and four were lower. While no geographic pattern among the significantly higher counties is discernible (fig. 4), the counties with the lower rates appear to be concentrated in the eastern part of the State. No urban-rural relationship is apparent.

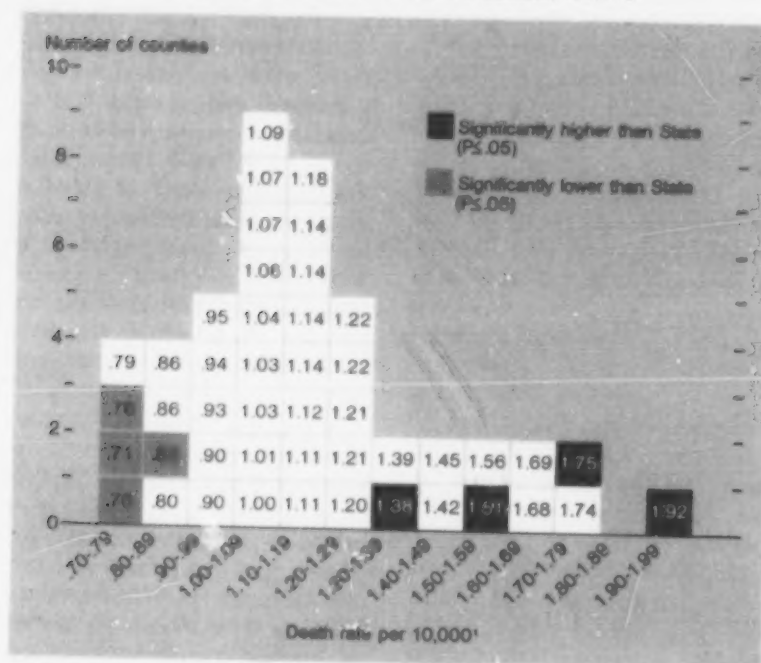
The methods used in committing suicide showed a fairly consistent pattern in the 1970s, with firearms accounting for 78.7 percent of the deaths. Table 2 displays the average annual percentage distribution of methods of suicide within race and sex groups. Firearms were used by 80.6 percent of the white males but by only 56.9 percent of the nonwhite females. National data indicate that 62.1 percent of males' suicides involved firearms in 1975 (7). The use of firearms as a method of suicide by the South Carolina residents was noticeably above the

Figure 4. Suicide death rates by county—South Carolina, 1970-78



¹Average annual rates directly adjusted for race to 1970 South Carolina population.

Figure 5. Frequency distribution of race-adjusted average annual death rates by county, suicides of South Carolina residents, 1970-78



Directly adjusted to 1970 South Carolina population

national average, particularly for females. In 1975, the percentage of females using firearms to commit suicide was 74.1 percent in South Carolina compared with a national average of 36.1 percent (7).

Strangulation, which includes hanging, is the second most frequently used method and, proportionally, it was used twice as often by nonwhites as by whites. This difference can be attributed mainly

to nonwhite males. The proportion of males choosing this method in 1975 was 8.6 percent in South Carolina and 14.3 percent in the nation.

Poisoning by liquids or solids ranked third, and approximately twice as many females as males used these methods. Poisoning by "other gases" ranked fourth among the methods used in the South Carolina suicides. In 1975, 18.9

percent of South Carolina females used poisons, all forms, compared with 42.1 percent of the females in the nation (7).

The use of only three methods varied noticeably by age group. Firearms played a role in approximately 70 percent of the suicides of those under 25 years, but they accounted for more than 80 percent of the suicides of those 45 and older. The use of hanging or strangulation was higher among people in their late teens and twenties. For the 15-19-year-old groups, 12.8 percent had used this method of suicide as compared with an average of 7.1 percent overall. Poisoning by liquids or solids accounts for 18.2 percent of the suicides of 10-14-year-olds and approximately 10 percent of the 15-25-year-olds, but this method was a factor in less than 4 percent of the suicides of persons over 45 years of age.

Discussion

Differences between suicide statistics for the Southeast and the nation are often noted. Our findings largely support previous work in suicide mortality. In this regard, the results are of epidemiologic value in confirming not only the more general national findings of sex differentials, rate changes with age, and an increasing death rate in younger age groups over time,

Table 2. Average annual percentage distribution of suicides by method, race, and sex, South Carolina residents, 1970-78

ICDA code no. and method	White males (N = 1,814)	White females (N = 612)	Nonwhite males (N = 279)	Nonwhite females (N = 58)	Males (N = 2,093)	Females (N = 670)	Whites (N = 2,426)	Nonwhites (N = 337)	Overall (N = 2,763)
E950—Poison (liquid or solid)	3.9	10.1	3.6	15.5	3.9	10.6	5.5	5.6	5.5
E951—Poison (gases in domestic use)	0.1	0.0	0.0	0.0	0.1	0.0	0.1	0.0	0.1
E952—Poison (gases, other)	5.3	3.6	1.1	0.0	4.7	3.3	4.9	0.9	4.4
E953—Strangulation, hanging	7.3	3.4	13.6	8.6	8.2	3.9	6.3	12.8	7.1
E954—Drowning	0.8	2.5	5.0	10.3	1.3	3.1	1.2	5.9	1.8
E955—Firearms, explosives	80.6	78.1	72.0	56.9	79.5	76.3	80.0	69.4	78.7
E956—Cutting, piercing instruments	0.6	1.0	1.8	3.4	0.7	1.2	0.7	2.1	0.8
E957—Jumping	0.5	1.0	2.2	0.0	0.7	0.9	0.6	1.8	0.8
E958—Other, unspecified means	0.9	0.3	0.7	5.2	0.9	0.7	0.7	1.5	0.8
Total	100.0	100.0	100.0	99.9	100.0	100.0	100.0	100.0	100.0

but also the findings peculiar to the southeastern United States. These regional differences include lower overall rates, greater differentials between races, and greater use of firearms in all race-sex groups than in the country as a whole.

Evaluation of the South Carolina data in detail, however, brings up a number of points with implications that differ from previously reported data. First, although methods of suicide used by males and females do differ significantly when all methods are considered, there is no appreciable difference between the sexes in the percentage who use firearms. This observation is in contrast to the data for the United States as a whole, which show that the use of firearms by males is approximately twice that of females. In terms of average percentages, use of firearms by South Carolina females was higher than their use by males in the nation. Nevertheless, the suicide rate observed for this State's females is about the same or lower as the national rate for females.

This observation implies that in South Carolina the choice of method is not a major factor in the lower rates for females than for males. This conclusion is contrary to previous theories (2,15,16). That is, the rate for South Carolina males is not higher than for females simply because males choose more lethal methods and thus "succeed" more often or because firearms use is more likely to be recognized as suicide and coded in the vital records as such. While both factors may be operative, if their effects are of any magnitude in this State, either the male and female suicide rates should be closer in value or the percentage who use firearms should be proportionally different. Instead, the sex differential in suicide death rates is comparable to that observed nationally,

while firearm use within the State is nearly equal for the sexes. Of particular import is the low suicide rate for nonwhite females who, relative to national data, use a high percentage of firearms, although their suicide rate is the lowest of the race-sex groups in the State.

Other researchers have proposed that the level of firearms use in the South is a function of socialization, pointing out that firearms play a greater role in the lifestyle of southerners than of nonsoutherners. They question whether a relationship exists between the lethality of firearms and the suicide rate (17,18). These South Carolina data provide strong evidence to support this assertion.

The clear rise in suicides in people under 25 years old is quite apparent over the 9-year period examined. The increase in suicides of the young has been observed throughout the country and certainly represents a matter of concern. Accompanying this increase is a significant decline in rates of the 50-74 year age group. Since this age group exhibits the highest average rate for the study period, this reduction in suicide mortality is noteworthy.

The geographic analysis of suicide rates by county failed to distinguish a pattern between the few counties having direct access to a medical examiner or a forensically trained pathologist and the counties relying on the State's general referral system for pathological evaluation of suspicious deaths. As this tangential issue is analyzed only to the extent that an obvious finding will not be overlooked, the lack of a noticeable difference cannot be interpreted as no difference. A detailed analysis of all external causes of death, supplemented by other sources of mortality data, would be required to examine adequately any existing differences.

A finding of some interest is the urban-rural distribution of suicide rates in South Carolina. South Carolina has 46 counties, and in 1970 only 6 had more than 50 percent of their population classified as urban (19). In this study, no notable urban-rural pattern in the race-adjusted county suicide rates was observed. The highest rates were found, interestingly, in primarily rural counties. Of the four counties that had significantly high rates, only one is predominantly urban. In general, the suicide death rates of the more urban counties were near the median of the distribution displayed in figure 5.

The variation observed between national and southern suicide rates may well be related to broader cultural factors rather than to sharp urban-rural differences. This interpretation does, however, call for a more detailed appraisal. Suicide rates of white South Carolinians are roughly similar to their national counterparts. Previously, one might have argued that increased firearm usage counteracted possible deterrents to suicide present in the southern culture, such as less crowding, less social and environmental stress, and a greater social support network, thus causing rates similar to the national average. Now this premise is questionable. If the percentage of those using firearms does not play a significant contributing role in determining the suicide rate, then the assumed beneficial southern cultural differences must have largely disappeared or have a more questionable impact, at least among whites. The cultural difference hypothesis, however, may still apply to nonwhites. Despite higher firearms usage, the rates of suicides among southern nonwhites are well below the national average for nonwhites.

The differences between suicide rates of southerners and the na-

tional rates need to be given greater attention by social and behavioral scientists concerned with suicide. As exceptions to observed national trends, these differences provide a fertile testing ground for the generalizability and interconnectivity of theories regarding suicide. Toward this end, the continued examination of vital records data remains a valid supportive technique.

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SYNOPSIS

ALEXANDER, GREG R. (University of South Carolina School of Medicine), GIBBS, TYSON, MASSEY, RONNIE M., and ALTEKRUSE, JOAN M.: *South Carolina's suicide mortality in the 1970s. Public Health Reports, Vol. 97, September-October 1982, pp. 476-482.*

In an epidemiologic study of suicide mortality among South Carolina residents for the years 1970-78, death certificates for 2,763 persons were reviewed. The overall suicide rates were lower than those observed in the same period for the United States. As expected, the highest rates were among white males; females and nonwhite males had rates with intermediate values, and nonwhite females, the

lowest rates. Rates for white males increased up to age 75. All other race-sex groups peaked at much younger ages. An increase in suicide rates over time appeared in those under 25 years, and a slight decline was observed in residents aged 50-74. Age-race-sex-adjusted rates proved relatively stable over the 9 years.

Geographically, race-adjusted rates by county varied from calculated expected values, with some suggestion of a pattern for the counties with the highest rates. However, no urban-rural differences were seen. Examination of methods used to commit suicide reveals that firearms were the most common means in all race-sex groups, accounting for 78.7 percent of deaths. The percentage of firearm

users was almost identical among white males and white females, differing markedly from the country as a whole. Females of both race groups were more likely to have used poisons than males, but the percentage of those who used poisons was much less than would be expected from national data.

This study confirms previous findings of sex and race differentials, rate changes with age, increasing rates in young people, and lower overall rates in the Southeast compared with the entire country. Interpretation of race-sex specific rates, together with suicide methods, lends support to the assertion that suicide rates are independent of methods. Rate trends by age groups over time are believed to have important implications.

Nutrition Services for the Handicapped Child

MARIEL CALDWELL

SOME TYPE OF CHRONIC IMPAIRMENT affects 10 million children in the United States, according to the Select Panel for the Promotion of Child Health (1). Although it is difficult to find sound data on the numbers of children with chronically disabling or life-threatening disorders, estimates run as high as 3 million. In a Rand Corporation report, it is estimated that 2,883,000 children have sensory disorders (hearing, vision, and speech), 1,676,000 have other crippling conditions, and 50,000 are multiply handicapped. Also, 2 to 3 million children in the United States suffer from mental retardation (1).

Some of the major handicapping conditions affecting children today are fibrocystic disease, congenital heart disease, phenylketonuria, hemophilia, cerebral palsy, sensory

disorders, congenital anomalies (cleft palate, meningocele), and mental retardation (2).

Importance of Nutrition

Adequate nutrition is essential for the growth and health of a handicapped child, just as it is for the growth and health of a normal child. A handicapped child has the same qualitative nutritional needs as do all children and may have even greater needs because of the handicap. In fact, nutrition may be the most important factor in the survival of some handicapped children. In others, it can play a role in preventing further delays in development or in reducing the debilitating effects of the handicapping condition, for example, of phenylketonuria and other metabolic errors.

Children with handicaps are vulnerable to the same stresses, including infectious disease, that place other children at nutritional risk, and they often have additional

problems with greater frequency than other children (3).

Studies have shown that developmentally delayed children are particularly susceptible to nutritional disorders, for example, low intake of nutrients, anemia, underweight, overweight, and short stature. Some nutritional disorders are linked to feeding problems such as difficulty in sucking, swallowing, chewing, food acceptance, and self-feeding (4).

Changes in Major Handicaps

The major handicapping conditions in children have changed over the past 50 years. Fifty years ago conditions such as poliomyelitis, with the resulting orthopedic deformities and other orthopedic consequences, were among the leading causes of handicapping. Since some of these problems could be resolved with surgery or other short-term intervention, nutrition was of minimal concern. Today, only a minority of children with crippling conditions require short-term intervention; nu-

Teasheet requests to Ms. Mariel Caldwell, Regional Nutrition Consultant, Department of Health and Human Services, Region V, 300 South Wacker Dr., Chicago, Ill. 60606.

tritional care has been shown to be important in many of these conditions, and it often needs to be maintained for long periods (5).

At the time that orthopedic problems were of major concern, nutrition was a relatively new science, and much less was known about its relation to the normal growth, health, and development of children. Fifty years ago little research had been carried out on the special nutrition problems of the handicapped child, and health professionals had little training in the nutritional care of children with handicaps.

Developing Nutrition Services

In the early 1950s, the interest in mental retardation was reflected in the funding of child development clinics under Title V of the Social Security Act. In the clinics, health professionals skilled in caring for the mentally retarded provided comprehensive services for evaluating and treating children with this condition (6).

Increased national concern for the mentally retarded resulted in the establishment in the 1960s of the University Affiliated Centers for training health care professionals to evaluate and manage the treatment of developmentally disabled children. These centers employed nutrition personnel capable of providing appropriate nutrition services to the children referred to the centers. Nutrition assessment and treatment was, and is, an important part of this interdisciplinary training program.

The 1979 Amendments to the Social Security Act authorized new types of medical care projects that included intensive infant care. These projects provided for the regionalization of perinatal care and for making the services needed by the high-risk infant available

throughout the State. The importance of nutritional care for infants of low birth weight and infants with severe surgical problems became evident, and in 1978 three programs to train nutritionists in neonatal and perinatal nutrition were established. In 1970 the Minnesota State Crippled Children's Service became a pioneer in the development of nutrition services for children cared for by the program. A nutritionist was hired to provide assessment and counseling in the crippled children's clinics and to oversee the development of other hospital and community nutrition services needed by the population that was to be served. Today several States have full-time nutritionists in their crippled children's agencies, and others have arranged to have nutritionists assist in planning for or in providing direct services to the handicapped children.

In 1975, under the authority of the Title V grants to institutions of higher learning, project grant support was extended to selected regional pediatric pulmonary centers. The centers were to be models of excellence in the services, training, and research related to the respiratory diseases of infants and children. For a program to win approval, it was considered essential that the minimal core staff include nutritionists (7).

Further impetus was given to nutrition services for the handicapped child through the Supplemental Security Insurance/Disabled Children's (SSI-DC) program legislation, which covered many conditions requiring nutritional care as a major component of treatment. The accompanying regulations published in 1979 listed nutrition services as one of the services that was to be available to program-eligible children when such services were needed to assist in carrying out the child's individual service plan (8).

To provide guidance in implementing the SSI-DC regulations, a national conference was held in March 1980. The meeting focused on the nutritional needs of developmentally disabled children and their families. At this conference the nutritional problems of handicapped children were delineated, existing delivery systems for meeting their nutritional needs were identified, and the components of optimum delivery systems were proposed. Standards of professional practice were addressed, and recommendations were made for the training of the nutrition personnel who were engaged in providing the major components of nutritional care. The involvement of many disciplines and health care providers was identified as essential for comprehensive nutrition services, and recommendations were made for the development of inter- and intra-agency networks within States to meet the continuum of care needs of this handicapped population (9).

Following the conference, a committee was formed to prepare a programmatic guide for establishing and ensuring adequate nutrition services for the handicapped children served by crippled children's programs. In "Nutrition Services for Children With Handicaps, A Manual for State Title V Programs" (3), a system is outlined for assessing existing services and a protocol is presented for planning, implementing, monitoring, and evaluating nutrition services for the child with handicaps.

Recent Nutrition Research

In 1981, data became available from a collaborative study on the nutritional status of a group of developmentally disabled children. In this study, jointly carried out by four University Affiliated Centers (Ohio State University, Children's Hospital of Los Angeles, George-

town University, and the University of Washington), the nutritional status, physical development, and feeding characteristics of children who manifested delays of unknown etiology in their cognitive development were examined.

Dietary, clinical, biochemical, and social data from the study indicated a need for intervention in the areas of nutrition and feeding. Forty percent of the children in the study group were below the fifth percentile of the National Center for Health Statistics reference data for weight, height, or weight for height. Fifty-seven percent were delayed in their feeding-skill development, and feeding problems were associated with shorter stature and a lower weight-for-height ratio. When the subjects were classified by motor characteristics, the nonambulatory children were shorter, weighed less, and had less well-developed bones than children at the other motor extreme. Dietary and biochemical differences were found according to motor group, although there was evidence of nutritional risk in each group. Use of anticonvulsant medication was found to be a significant factor in nearly half of the biochemical variables (10).

Unmet Needs

Although great strides have been made over the past few decades in understanding the nutritional needs and problems of handicapped children, there is still much to learn about the specific nutritional needs and optimal care of children with many of the chronic and handicapping conditions that are observed today by the staffs of crippled children's services, University Affiliated Centers, and children's hospitals.

Training should be expanded for nutrition personnel and for other health care providers involved in

nutrition screening, assessment, and treatment of children with handicaps. Both long-term training, such as that offered by the University Affiliated Centers, which is intended to provide leadership in the field of mental retardation, and short-term training of health professionals to provide components of nutrition services in a variety of settings must increase. As more knowledge is obtained through research, continuing education for health personnel will continue to be needed.

Finally, administrators of programs serving the handicapped must become more aware of the importance of nutrition for that population. This awareness should result in more adequate planning of programs and better implementation of the nutrition services that are essential for the optimal development of many of the children served by these programs.

Conclusion

The many activities and developments underway show that there is broad interest and concern for the nutritional well-being of the handicapped child. Yet, although much has been done over the past few decades to improve the nutritional health of handicapped children, many tasks remain to be accomplished in the areas of nutrition research, education, and training and in the programming of nutrition services if these children are to reach their maximum potential and the highest possible quality of life.

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Project to Help Reach Goal of Tuberculosis Elimination



The American Lung Association (ALA) is cosponsoring with the Tuberculosis Control Division of the Centers for Disease Control (CDC) of the Public Health Service a new short-term treatment for some 1,400 patients with pulmonary tuberculosis in 15 to 20 major cities. In health departments and university chest clinics in these cities, the relative effectiveness of 6-month and 9-month treatment periods, as opposed to the current treatment period of 9 to 18 months, is being tested. The study, which began in October 1981, will continue for 3 years.

Two benefits expected from this program are that people will be treated and cured more quickly and that the cost of treatment will go down. Previously, patients with tuberculosis were seen once a month and often, for various reasons, did not take their medication. Their failure to do so meant that they did not get well as quickly as expected. In the new program, patients are seen twice a month, and with closer, more frequent supervision are expected to get well sooner. Under the 6-month plan, annual savings in drugs and services are estimated to exceed \$10 million.

According to Dr. Edward M. Sewell, vice president of the ALA, "The biggest obstacle to the control of tuberculosis today is compliance—getting patients to take their pills on a regular basis." This short course will cut the

pill-taking period in half for most tuberculosis patients. In addition, the project requires health centers to create improved methods of patient supervision. Shortening and supervising the treatment for tuberculosis should make it much easier for patients to continue with the full-course treatment until they are cured.

The proposed study was designed by the Research and Development Branch of the Tuberculosis Control Division, Centers for Disease Control, with the assistance of a group of experts in the field of tuberculosis from the ALA's medical arm, the American Thoracic Society's Scientific Assembly.

"The potential benefits of this project go beyond the eradication of tuberculosis," says Dr. Lawrence Farer, Director of the Tuberculosis Control Division of the CDC. "When health departments develop specific strategies to help patients cooperate in their treatment," he said, "they will be creating approaches useful in controlling other health problems."

Though no longer the scourge it once was, tuberculosis persists and in some areas is increasing. In the pockets of poverty of our major cities the rates are often as high as 5 times the 1980 national average of 12.3 cases per 100,000. In 1990, 27,749 people were added to the tuberculosis case list, and 1,770 people died of this disease, which today is both preventable and curable.

NDAB's Fourth Annual Report "Diabetes in the 1980's: Challenges for the Future"

■ The National Diabetes Advisory Board (NDAB) has announced its recommendations for maintaining the momentum of diabetes research, health care, education, and control programs in the United States. In its fourth annual report, the board called upon Congress to strengthen its efforts in support of the Federal Government's war on diabetes mellitus and the disease's life-threatening complications.

The board notes in its annual report that since 1976, the cost of medical care and losses due to disability and premature death have doubled to \$9.7 billion annually. Because 40 percent of diabetics are age 65 or older and many persons with diabetes are poor, much of this economic burden falls on public sources such as Medicaid and Medicare.

Board chairman Dr. Arthur Rubenstein (University of Chicago) commented that the level of research support in recent years has fostered significant progress in virtually every area of investigation of diabetes. These advances range from a better understanding of the genetic, viral, and immunological factors that underlie its development to the successful production of human insulin through recombinant DNA technology.

Among other accomplishments cited in the report as examples of the achievements that result from a strong national research effort, are the devel-

opment of laser treatment to reduce blindness from diabetic retinopathy and the successful transplantation of insulin-producing cells from one animal species to another without immune rejection.

The NDAB noted further that improved application of research advances to the prevention and treatment of diabetes would not only enhance the quality of life for thousands of diabetics, but would also result in a tremendous savings to the economy. The annual savings would be more than sufficient to fund the diabetes research effort. The NDAB cautioned, however, that unless a firm level of research support is maintained, the continuing flow of significant progress in this field will be jeopardized. If this were to occur, as now seems likely, it would be a tragedy of immense proportion. In this regard, the board has recommended the budget levels for diabetes-related activities for each of the Institutes of the National Institutes of Health and the National Institute of Mental Health that will be necessary to continue the diabetes research effort and prevent severe retrenchment of research programs.

The Centers for Disease Control, through its 20 community-based diabetes control demonstration projects, has made significant progress toward establishing a coordinated program of improved health care delivery services for persons with diabetes. The board's recommendation calls for expansion of these diabetes control demonstration programs to additional States in order to expedite the transfer of new research information to community physicians and allied health professionals.

The report also focuses on the diabetes-related health care concerns of American Indians, who have one of the highest diabetes rates in the world. The board endorses strengthening the existing five model diabetes projects that were initiated to devise culturally effective methods of reducing the severity and cost of this disorder in the Indian population, and it supports the establishment, through the Indian Health Service, of additional projects in areas of need.

Diabetes in the 1980's: Challenges for the Future, fourth annual report. Available from National Diabetes Advisory Board, P.O. Box 30174, Bethesda, Md. 20814.

Bureau of Radiological Health Issues Report on Performance of RF Survey Instruments

■ The Bureau of Radiological Health, Food and Drug Administration, has published a report that describes the test methods and results of a study of three commercially available radio-frequency (RF) survey instruments and one one-of-a-kind device. These instruments are designed to measure the strength of the RF fields emitted during the operation of dielectric heaters, shortwave diathermy units, and other products that emit RF energy. They are evaluated over the frequency range from 10 to 100 megahertz with emphasis on 27.12 megahertz, an ISM frequency at which many of the RF products operate.

Two of the instruments evaluated are used for electric (E) field measurements—the RHM-2 isotropic E-field radiation hazard monitor and the EFS-1 single-antenna electric field strength meter. The other two instruments are used for magnetic (H) field measurements—the Southwestern Research Institute SwRI one-of-a-kind isotropic H-field meter and the Narda Microwave Corporation 8607 system, which consists of a Narda 8633 isotropic H-field probe and a Narda 8616 readout. All four instruments were tested for line-

arity, calibration accuracy, amplitude modulation response, directivity, antenna patterns, temperature response, drift and noise, radiofrequency interference, and polarization response.

A discovery made during this series of tests was that an instrument may not be suitable for survey use even though it works well in an ideal exposure situation where only the probe sensor is exposed to RF radiation. It was concluded, however, that the instruments evaluated can function properly and yield reliable field measurements under most conditions of normal use. Several additional instruments designed for use in the same frequency range are commercially available and are currently being evaluated by the Bureau. The results of these tests will be reported in future publications.

Performance Evaluation of RF Electric and Magnetic Field Measuring Instruments. FDA Publication No. 82-8158. Available only from National Technical Information Service, 5258 Port Royal Rd., Springfield, Va. 22161. Order No. PB 82-195009. \$7.50 paper copy and \$4 microfiche.

Dental Radiology Sourcebook is Available

■ The Food and Drug Administration's Bureau of Radiological Health has prepared a new publication that presents an annotated listing of educational materials in dental radiology designed to assist persons concerned with the education of dental and dental auxiliary students and with the continuing education of dental practitioners. The publication was compiled by surveying dental schools, audiovisual producers, textbook publishers, professional associations, and companies involved in the production of dental radiology materials. To keep the information current, the Sourcebook lists printed matter published after 1975 and audiovisuals produced after 1973.

The publication is divided into various subparts that provide background information on specific as well as on more general areas that have a bearing on the practice of dental radiology.

Entries have been organized into a number of categories, including "Scientific Background," "Radiographic Techniques," "Workbooks and Self Teaching Manuals," and "Film and Film Processing." One appendix to the document provides addresses of publishers of the educational materials. Another contains guidelines issued by the American Association of Dental Schools for dental auxiliary radiology curriculum objectives. For further information, contact Dr. Lireka Joseph, Bureau of Radiological Health (HFX-76), 5600 Fishers Lane, Rockville, Md. 20857, telephone 301: 443-4600.

Sourcebook of Educational Materials for Dental Radiology. FDA Publication No. 82-8182. National Technical Information Service, 5258 Port Royal Rd., Springfield, Va. 22161. Order No. PB 82-165580. \$9 paper copy and \$4 microfiche.

Does Special Packaging of Public Service Announcements Increase Television Air Plays?

■ U.S. television stations may be influenced as much by the packaging of public service announcements (PSAs) as by the quality of the announcements, according to a 2-year count of TV response cards made by the National Heart, Lung, and Blood Institute (NHLBI). As a means of increasing total air plays for its annual television campaigns, the institute plans further tests of this hypothesis in 1982 and 1983.

The NHLBI sends high blood pressure education messages to public service directors at more than 700 commercial TV stations three times a year. For every mailing since 1980, the directors staff were asked to mark up and return a postage-paid card predicting the number of times that the announcements would be aired. A running tally of both the number of cards returned and estimates of air plays for each return has provided a crude barometer that helped NHLBI communicators to track the effectiveness in placing the PSAs by looking at comparative station interest over time. A sudden drop in cards could warn of a drop in air plays. Conversely, an increase in cards might point to the opposite conclusion.

Figure 1. Packaging for hypertension announcements



During the 3 years that NHLBI has packed mail-back cards with its high blood pressure education messages, there appears to be an association between broadcasters who take the time to return survey cards and those who schedule the most plays of these messages. Until now, such indications were based largely on informal conversations with television public service directors—often months after the fact—

when recollections may have become hazy.

Competition is on the rise for limited time slots as many new nonprofit groups learn how to take advantage of public service time on television and radio each year. Operating within this competitive situation, NHLBI's public educators must constantly seek ways to retain their share of free broadcast time.

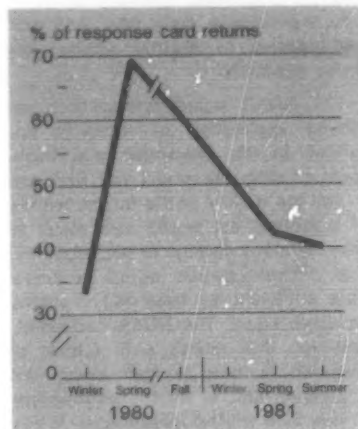
In 1980, when actor Edward Asner agreed to be a volunteer broadcast spokesman for the National High Blood Pressure Education Program, there was optimism based on the expectation that he would increase viewer interest in high blood pressure messages. However, it was also reasoned that since TV public service directors are the first and therefore the most crucial target, a special marketing package aimed specifically at these broadcast gatekeepers was worthwhile and was subsequently planned. Like the TV message, the mailing box and the marketing components were designed to feature Asner and the popularity of his role as television's "Lou Grant."

When the spring 1980 announcements were mailed to stations throughout the nation, the actor's name was emblazoned on film boxes (fig. 1) and cover letters, and even the mail-back cards were addressed to "Edward Asner" at high blood pressure headquarters in Bethesda, Md.

Station response to the mailing was surprisingly high (fig. 2). More than two-thirds (69 percent) of those TV public service directors who received the spring 1980 package filled out and returned cards, representing a stunning 109 percent improvement over the previous high blood pressure card response of 33 percent for winter 1980. Following this peak, mail-back responses for subsequent, nonspecial mailings of high blood pressure messages declined, but at a moderate rate that may indicate a positive residual effect from the Asner package.

For the 1982-83 television season, more special celebrity packages are planned; this season's mail-back card trends will be cross-referenced with data from Broadcast Advertisers Reports (BAR), a "sweep" service that records television messages played by 265 preselected stations within a specified period. Thus, BAR data, when compared with mail-back data for the same period, should make it possible

Figure 2. High blood pressure television PSA campaigns



NOTE: Only 3 mailings in 1980.

for NHLBI to document with more certainty the effectiveness of special packaging to reach public service directors. As an added bonus, NHLBI hopes to find a predictable relationship over time between BAR reports of actual air plays and the numbers of cards that public service directors return. If so, it may then be possible to judge air plays accurately when only the inexpensive card return system is used.

—WILLIAM MORRISON, Media Coordinator, Office of Prevention, Education, and Control, National Heart, Lung, and Blood Institute

Black and Hispanic Personnel In Selected Health Professions

■ The increased number of minority students graduating from health professions schools during the past decade undoubtedly increased the number of minority practitioners among the total supply of active health care providers. However, current statistics on the numbers, distribution, and characteristics of minority health care providers have not been available to document the extent to which increases in the numbers of minorities trained in the health professions has affected the racial-ethnic composition of the total supply of practitioners.

A recent publication of the Bureau of Health Professions, Health Resources Administration, addresses this lack. The report provides estimates of current (1980) levels of the supply of

Estimated and projected active supply of total U.S. physicians and black physicians, 1980 and 2000

U.S.-trained physicians (doctors of medicine and osteopathy)	Number
Total practitioners:	
1980 (estimated)	350,100
2000 (projected—lowest estimate)	560,900
Black practitioners:	
1980 (estimated)	11,700
2000 (projected—highest estimate)	30,000
Ratio of total practitioners to total population:	
1980	1:647
2000	1:464
Ratio of black practitioners to black population:	
1980	1:2,264
2000	1:1,095
Additional black practitioners needed to reach parity:	
1980	29,260
2000	40,680

SOURCE: Based on tables 1 and 2 in "Estimates and Projections of Black and Hispanic Personnel in Selected Health Professions, 1980-2000."

black practitioners in medicine, dentistry, and pharmacy and of Hispanic practitioners in pharmacy, as well as an assessment of what the supply picture for these practitioners may be by the year 2000 under a variety of assumptions.

In the publication, the available data on minorities in several major health professions are examined, the changes that have occurred are assessed and analyzed, and forecasts are offered of what the future may hold for minority participation in the health professions.

Under the high series presented in the report, the number of black persons per black physician in the year 2000 is expected to be more than double the 1980 national average (see table). The low series of total supply estimates is coupled with the high series of black supply estimates to illustrate the lowest estimate of additional practitioners necessary to achieve parity in supply (last item in table).

Estimates and Projections of Black and Hispanic Personnel in Selected Health Professions. DHAP Report No. 82-4. December 1981. Limited number of copies available from Division of Health Professions Analysis, Bureau of Health Professions, Health Resources Administration, 3700 East-West Highway, Hyattsville, Md. 20782.

1983 Annual Meeting of Society for Clinical Trials to be Held May 8-11 in St. Louis, Mo.

The fourth annual meeting of the Society for Clinical Trials will be held in St. Louis, Mo., May 8-11, 1983. The sessions will focus on the design, organization, management, and analysis of clinical trials. Topics of interest for contributed papers or poster sessions include but are not restricted to the following: new methodology for the design, monitoring, and analysis of clinical trials; data banks and observational studies as substitutes for clinical trials; the design and operation of clinical trials; data management—new methods, quality control, availability of data base management systems, and availability of software for analysis; clinical trials in special clinical areas

such as psychopharmacology, new surgical procedures, or infectious disease; clinical trials in which the unit of intervention is a group or community; monitoring for adverse or side effects; patient compliance; ethical issues; effective dissemination of clinical trial results; generalization of clinical trial results and their applicability to medical practice; and documentation and storage of data.

Abstracts of papers must be received by January 1, 1983. For further information, write to Christian R. Klimt, MD, Secretary, Society for Clinical Trials, Inc., 600 Wyndhurst Ave., Baltimore, Md. 21210.

NIAID Laboratory Has Isolated Possible Causative Organism of Lyme Disease



Staff scientists of the Rocky Mountain Laboratories (RML), National Institute of Allergy and Infectious Diseases (NIAID), have detected in ticks and isolated from them a spirochete that may be the causative organism of Lyme disease (sometimes called Lyme arthritis).

The disease first was observed in Lyme, Conn., in the summer of 1975, although cases also have been found in other States. Much has been learned about Lyme disease since a research team from Yale University, supported by the National Institute of Arthritis, Diabetes, and Digestive and Kidney Diseases and headed by Dr. Allen C. Steere, began investigations.

The ticks, *Ixodes dammini*, studied at RML were collected from vegetation on Shelter Island, N.Y., a known focus of Lyme disease. Investigators at RML detected spirochetes in 61 percent of the ticks collected, the number varying from a few microorganisms in some ticks to large clumps in others. The spirochete recovered from the ticks now has been grown in pure culture in the laboratory. Electron microscopy revealed that it is similar in structure to the treponemes, one species of which causes syphilis.

In tests with New Zealand white rabbits, the scientists found that lo-



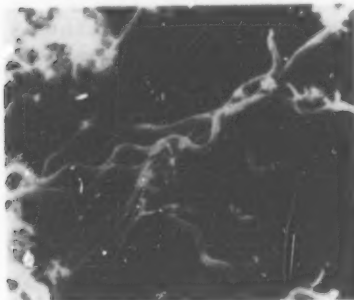
Ixodes dammini female tick and nymph feed on experimental animal

sions like those of erythema chronicum migrans with which Lyme disease usually begins, developed in the skin of rabbits fed upon by infected ticks. Serums of all rabbits fed upon by such ticks contained antibodies to the specific spirochete 30 and 60 days after tick exposure. The RML investigators also demonstrated that the spirochete binds antibodies in the serums of patients recovering from Lyme disease. They studied serums from nine patients who had clinically diagnosed Lyme disease, that is, the diagnosis was made on the basis of symptoms, since no laboratory tests existed. Serums diluted up to 1,280 times contained antibodies to the *I. dammini* spirochete, the investigators found. For comparison, they tested serums of 14 persons with no history of Lyme disease. At any level greater than 20

dilutions, there was no reaction with the spirochete.

This result, the scientists observed, suggests that the organism "may be involved in the etiology (cause) of Lyme disease." In the first paper published describing their findings, the scientists noted that organisms with the structural characteristics of spirochetes had been reported to be associated with ECM in Europe more than 30 years ago. The association was never confirmed, but the improvement in the symptoms of Lyme disease following penicillin therapy also points to a penicillin-susceptible bacterium as a causative agent.

NIAID plans further epidemiologic studies with the New York State Department of Health and the Wisconsin State Departments of Health and Fish and Wildlife.



Scanning electron micrograph of *Ixodes dammini* spirochete, causative agent of Lyme disease

The isolation of the spirochete by NIAID investigators was reported in the June issue of *Science*. The authors of the report, all from the Rocky Mountain Laboratories, are Dr. Willy Burgdorfer, head, Arthropod-Borne Diseases Section, Dr. Alan G. Barbour, Laboratory of Microbial Structure and Function, and Stanley F. Hayes, Operations Branch. In addition, Dr. Jorge L. Benach, New York State Department of Health, Dr. Edgar Grunwaldt, Shelter Island, N.Y., and Dr. Jeffrey P. Davis, Wisconsin State Department of Health and Social Services, contributed to the study.

Plan and Operation of Second National Health and Nutrition Examination Survey, 1976-80

■ All the necessary plans and procedures for successfully conducting a survey on the nutritional and health status of the United States population are outlined in a report from the National Center for Health Statistics (NCHS). The report contains a detailed explanation of a major NCHS survey in which health data are collected through direct medical examinations, including tests and other procedures such as spirometry trials and speech recordings—the National Health and Nutrition Examination Survey. Based on probability sampling, it is used to collect a broad range of morbidity data and related health information.

The data collection techniques used in the survey are described in the report and range from an initial household interview to a final examination administered by physicians or trained technicians in mobile examination centers. Electrocardiograms, height and weight measurements, X-rays, and blood tests are some of the examinations routinely given during the survey. Data derived from these examinations

permit estimation of the distribution within the population of a broad variety of physical, physiological, and psychological health-related measurements. The data show the prevalence in the United States of specifically defined diseases such as diabetes and arthritis, including those cases not previously identified.

Other detailed descriptions of the survey presented in the report include questionnaires and tests, the approach used to assess the nutritional status of the U.S. population, the sample design, the operation, and measures used for quality control.

Data collected through the survey will be presented in the NCHS Vital and Health Statistics series reports.

Plan and Operation of the Second National Health and Nutrition Examination Survey. Vital and Health Statistics Series 1, No. 15. Department of Health and Human Services Publication No. (PHS) 81-1317. Public Health Service, Hyattsville, Md. 20782. Available from U.S. Government Printing Office, Washington, D.C. 20402. GPO Stock No. 017-022-00752-5. Price \$6.50.

First Birth Rates Rise Most in Age Group 30-34 Years

■ Well-educated women in their late twenties are continuing to postpone motherhood while their counterparts in their thirties are having the first births they had postponed, a Federal study of trends in first births to older mothers shows.

The study, conducted by the National Center for Health Statistics, is based on information reported on birth certificates filed in the States. In the study, the demographic characteristics of older first-time mothers and the health aspects of their childbearing over the period 1970-79 are examined.

The number of first births to women in their thirties more than doubled in the 1970s, increasing from 54,108 in 1970 to more than 115,000 in 1979. Although the rates of first birth rose for women in every age group 25-39 years, the increase was largest for women in their early thirties. The rates of first births for women 30-34 years of age rose 73 percent, from 7.0 first

births per 1,000 women in 1972 to 12.1 in 1979.

The increase in the rate of first births for women in their thirties is a direct consequence of the earlier decline in such rates for women in their teens and early twenties. Because so many younger women had postponed childbearing, the number of women reaching age 30 still childless increased dramatically during the 1970s. As a result, by the mid- to late 1970s, a rapidly growing number of women aged 30 years and older are "eligible" to have a first birth.

The delayed childbearing occurred principally among the best educated women, the study shows. Although only 28 percent of the first-time mothers aged 30-34 years in 1970 had completed 4 years or more of college, nearly half of the first-time mothers aged 30-34 years in 1979 had done so.

First births to mothers 30 years and older have long created concern for the health of the mother and child. The study indicates that the reasons for delayed childbearing have changed. The infrequency of first births to moth-

ers aged 30 and older as recently as 1970 suggests that previously many women who had a first child at older ages did so not by choice but rather after many years of difficulty in conceiving and carrying a baby to term. In contrast, the desire of many women to complete their education and become established in a career appears to be an important factor in the recent high levels of delayed childbearing.

Although women in their thirties face a higher risk than younger women of having a baby with certain birth defects, health data associated with first births to older mothers in the 1970s suggest that delayed childbearing, because it is occurring principally among well-educated women, may carry fewer health risks now than it did even a decade ago.

Early initiation of prenatal care is

associated with a mother's educational attainment, and older first-time mothers, better educated than their younger counterparts, now begin prenatal care very early. In 1979, nearly 90 percent of the first-time mothers 25-34 years of age initiated prenatal care in the first trimester of pregnancy, compared with 57 percent of teenagers and 80 percent of mothers 20-24 years of age.

As measured by the incidence of low-birth-weight babies (less than 5 lbs., 8 oz.), the ideal age for a mother at first birth is 25-29 years. Women in this age group have proportionately fewer low-birth-weight babies than women in their thirties. However, among first births in 1979, the levels of low-birth-weight infants to the best educated women in each age group 20-39 years were 20 to 30 percent below the averages for all women of these ages.

NIMH Will Fund Prevention Centers



How can mental health caregivers best apply available research knowledge to prevent mental or emotional illness in people known to be at high risk, including such vulnerable persons as children of psychotic parents, the recently bereaved, and people undergoing acutely stressful life crises or transitions? What kinds of interventions can be built from research knowledge to help forestall even the most serious disorders at their earliest stages?

To seek answers, the National Institute of Mental Health (NIMH) will fund several multidisciplinary Prevention Intervention Research Centers in fiscal year 1983. Each new center will draw upon the existing body of mental health research knowledge to devise specific early intervention approaches for vulnerable populations and then demonstrate their effectiveness as prevention models. Once tested, it is expected that the prevention program models will be disseminated, adapted, and further refined by prevention practitioners.

According to the special research grant announcement recently mailed to the field, "the new Prevention Intervention Research Centers will be a key NIMH mechanism for developing and advancing our knowledge on early

prevention interventions." In the grant announcement, "early preventive intervention" is defined as (a) actions taken while it is still possible to either anticipate or reverse an early pathological-maladaptive process and (b) interventions occurring before the need for treatment or rehabilitative service arises. "The aim of the preventive intervention research program," according to the announcement, "is to test empirically the benefits of systematic attempts to modify those factors which lead to specific mental disorders, significant psychological dysfunction and/or emotional disturbance."

In the grant announcement, three guidelines are offered for prevention research programs that may be considered for potential funding. The research should be in areas where (a) a sufficient research knowledge base exists to support an early preventive research effort; (b) existing research data indicate that it is possible to identify population groups not yet experiencing the specific dysfunction, but which are at high risk; and (c) significant potential exists for achieving the main objective of early intervention, namely, preventing the occurrence of the specific mental or emotional disorders or maladaptive psychological conditions. The research program may focus either on preventing psychological dysfunctions resulting from "debilitating developmental circumstances" or "significant acute

transitional life crises or stressful life events."

Each of the pioneering centers will be required to formulate a multidisciplinary research program around "a specific, clearly defined mental health problem or set of problems of major scientific and public health importance." These might include prevention of specific childhood disorders, stress in the family, or stress in the workplace. Or a center may choose to focus its attention on the relationship between mental health and physical health or between psychological and physical-environmental factors as they relate to mental illness.

As with the NIMH-funded Clinical Research Centers, the new centers will feature an environment of research excellence, in which a cluster of inter-related projects can be conducted around a problem theme. Each center is to have a multidisciplinary research team and may be located in a clinical, academic, or community setting. It must have sufficient collaborative arrangements with community agencies and professional schools in the area to carry out its preventive intervention research.

An important byproduct of each new center will be the training of promising scientists to carry out the complex techniques and advanced theories of mental health preventive intervention research. Each center will be required to work with at least two such research preceptors annually, and each center's program also must include a formal plan to disseminate research results on the early preventive intervention under investigation, as they emerge.

NIMH expects that approximately \$800,000 will be available in fiscal year 1983 for funding up to four Prevention Intervention Research Centers. The earliest possible funding for applications received November 1, 1982, will be July 1, 1983, for those received by March 1, 1983, December 1, 1984, and for those received by July 1, 1983, April 1, 1984.

Further information may be obtained from Dr. Juan Ramos, Director, Division of Special Mental Health Programs, Rm. 18-105, National Institute of Mental Health, 5600 Fishers Lane, Rockville, Md. 20857

—JAMES HELSING, Alcohol, Drug Abuse and Mental Health Administration

New Florida Health Planning Law Preserves Local Planning, Reduces Regulatory Burden

■ A new Florida statute, enacted in June 1982, significantly changes the structure of the State's health planning and certificate of need program while it preserves both strong local input and a continued emphasis on health care cost containment. The legislation (CS/HB 931, Laws of Florida 82-182) was supported by diverse groups that included both the for-profit and the nonprofit hospital associations in the State. It was passed overwhelmingly in both Houses of the State Legislature.

Under the new law, local input into the health planning and certificate of need process would be preserved by the establishment of local health councils financed by certificate of need application fees. The local health councils' primary function would be to develop a district plan for use in the certificate of need process by the State.

Major changes in the new Florida law follow.

- local planning agency boundaries to conform with State-designated boundaries for delivery of all other human service programs
- local health planning agency board members appointed by local units of government
- local planning agency required to concentrate most of its effort on planning functions; regulation becomes primarily a State function
- local planning agency to assist public health and mental health officials with allocation of funds, including block grants
- local health planning agency to assist with the development of competitive alternatives
- certificate of need review process cut from 90 to 45 days after application is complete.
- no public hearing requirements, letter of intent requirements, or batching requirements for minor, noncontroversial projects
- single, factfinding hearing in conjunction with local planning agencies on all major projects; requirements for reasonable presentation time, cross examination, and rebuttal
- single statewide planning methodology, with permitted adjustments in goals and standards to account for local circumstances
- State certificate of need decisions based on local plan
- State contracts with local health planning agencies; staff salaries at local level commensurate with State Career Service
- Statewide council composed of presidents of local councils, members appointed by the Governor, President of the Senate, and Speaker of the House.

The new law represents an innovative effort by Florida to preserve a local health planning structure but adapt it to unique State needs, while reducing the regulatory burden on providers and continuing to preserve the essential elements of a needed cost containment program. In addition, however, the State continues to search for new ways to control costs and improve quality and access in a changing environment. The new law creates a 17-member task force, (including major purchasers, consumers, and providers) with a full-time staff to explore further the issues of health care costs and competition. The task force is required to report its findings to the Governor and the Legislature over a 2-year period.

Given its high growth rate, high proportion of elderly population, and a high degree of competition in the hospital industry, Florida has experienced a major health care construction boom in recent years that is not expected to abate. In 1981 approximately \$1.5 billion in new capital construction was proposed in Florida—more than in any other State. In that same year, the Florida certificate of need program denied more proposed construction (\$300 million) than all but 16 States reviewed in 1981.

For more information on the new Florida statute, contact Marjorie Turnbull, Deputy Assistant Secretary for Health Planning and Development, Department of Health and Rehabilitative Services, 1317 Winewood Blvd., Bldg. 2, Rm. 258, Tallahassee, Fla. 32301.

Study Links TV Violence To Aggressive Behavior

■ Violence on television does lead to aggressive behavior by (some) children and teenagers who watch the programs, according to a National Institute of Mental Health update of a 1972 Surgeon General's report on television and behavior. The new report indicates that "a causal link between televised violence and aggressive behavior now seems obvious . . . In magnitude, television violence is as strongly correlated with aggressive behavior as any other behavioral variable that has been measured."

One conclusion presented in the update is that children who watch a lot of violence on television may come to accept violence as normal behavior. Such acceptance was found to be true for girls as well as boys and for children of all ages. Adults are susceptible as well to TV violence. Another observation in the report is that people who watch a lot of television are more apt, than light viewers, to see the world as a "mean and scary" place and to put less trust in others.

The report is based on results of a 24 state-of-knowledge reviews commissioned by NIMH from "24 of the most knowledgeable researchers available." The 1972 report drew on 300 studies completed before 1970; the new report covers more than 2,500 studies done between 1970 and 1980, including longitudinal, crosscultural, and short-term studies. Nearly 90 percent of all research on TV and behavior has been conducted within the past 10 years.

The researchers found that television has the potential to be a positive social agent: "The evidence is persuasive—children can learn to be altruistic, friendly and self-controlled by looking at television programs depicting such behavior patterns." The researchers recommended that parents mediate children's TV viewing by watching and discussing programs together, which may prevent negative influences and actually enhance children's growth capabilities.

Television has a therapeutic potential that might be exploited to help chronically mentally ill and elderly patients in institutions and emotionally disturbed children, according to the report. In addition, successful TV

campaigns on health issues have been conducted, which are evidence of television's vast health-promoting possibilities.

A group of seven consultants under the direction of Dr. David Pearl, chief, NIMH Behavioral Sciences Research Branch, guided the report. According to Pearl, the 1970-80 research overwhelmingly supports a causal link between TV violence and aggressive behavior.

Television and Behavior: Ten Years of Scientific Progress and Implications. U.S. Government Printing Office, Washington, D.C. 20402. GPO Stock No. 017-024-01129-1. Price \$5.

Report Shows Relationship of Socioeconomic, Geographic Factors to Height and Weight

Age-adjusted values for mean differences in height and weight of adults 18-74 years old with the highest and the lowest family income and educational level, by sex and race, United States, 1971-74

Sex and race	Annual family income	Educational level
Mean height difference in inches		
Males	0.7	1.7
White	.6	1.8
Black	.4	1.3
Females	.4	1.5
White	.4	1.7
Black	.4	.8
Mean weight difference in pounds		
Males	12	9
White	13	9
Black	10	18
Females	-11	-10
White	-8	-8
Black	-5	-13

NOTE: Negative signs indicate higher mean values for the lowest than for the highest annual family income or educational level.

SOURCE: Based on table A, p. 7, in the report.

■ A recent report from the National Center for Health Statistics shows the mean height and weight measures of adults 18-74 years by age, sex, and race in relation to annual family in-

Characteristics and Status of U.S. Registered Nurses as of November 1980

■ Final results from the second National Sample Survey of Registered Nurses (RNs) are presented in a recent report by the Bureau of Health Professions' Division of Health Professions Analysis, Health Resources Administration. The report provides November 1980 data on the demographic characteristics, employment status, and annual earnings of registered nurses in the United States, such as the following.

- As of November 1980, 1,662,382 persons in the United States, mostly

come, urbanization status, educational levels, and geographic region. The data were collected during the first National Health and Nutrition Examination Survey conducted from April 1971 to June 1974.

The report provides a number of important observations about the height and weight measures of adults in the United States, such as the following:

- The heaviest females are those with an income under \$4,000 and with less than 9 years of education. Conversely, the heaviest males are those with an income of \$10,000 and over with 12 years or more of education.
- Interracial differences in the age-adjusted mean weight for males ages 18-74 years are less than 8 pounds for each income and educational level. For females ages 18-74 years, these differences range up to 16 pounds.

The report shows that the observed mean height of both sexes is directly related to income and educational levels (see table). On the average, the tallest adults within each age category from 18 to 74 years are those at the highest educational level.

Height and weight of adults ages 18-74 years by socioeconomic and geographic variables, United States. Vital and Health Statistics, Series 11, No. 224. Department of Health and Human Services Publication No. (PHS) 81-1674. Public Health Service, Hyattsville, Md. Copies available from U.S. Government Printing Office, Washington, D.C. 20402. GPO Stock No. 017-022-0076-31. Price \$4.75.

women, had current licenses to practice as registered nurses. More than half were under 40 years old; the median age was 38.4 years. Almost two-thirds had obtained their basic nursing education in a diploma program, 19 percent in an associate degree program, and 17 percent in a baccalaureate program.

- There were 1,272,851 registered nurses employed in nursing in November 1980, or 76.6 percent of the 1.7 million nurses with current licenses to practice. Thirty-two percent were employed part-time. An estimated 8.3 percent of the RNs employed in nursing were from minority racial or ethnic backgrounds. The overwhelming majority of the RNs employed in nursing worked in hospitals and in staff-level positions. An estimated 64 percent spent at least half their time during a regular work week in direct patient care.

- The average annual earnings of RNs employed full-time in November 1980 were \$17,398. The lowest average earnings were found for staff nurses in physicians' or dentists' offices, \$12,048. Of the 388,537 nurses who had current licenses to practice in November 1980 but were not employed in nursing, 32,784, or 8 percent, were actively seeking nursing employment, or 2 percent of the 1.7 million registered nurses. More than two-thirds of these were looking for part-time jobs. The majority of those actively seeking nursing jobs had been looking for no more than 4 weeks.

An estimated 75,664 RNs were employed in nonnursing occupations; of these, 6,480 were seeking nursing employment. About half of the estimated 286,568 inactive RNs (not working or seeking work) were married and had children at home. Of the remaining inactive nurses who were not married or did not have children, about 117,500 were at least 50 years old. Thus, at most, about 27,000 of these inactive nurses were under age 50, were not married, and had no children at home.

The Registered Nurse Population, an Overview From National Sample Survey of Registered Nurses, November 1980. DHPA Report No. 82-5. Revised June 1982. Available from National Technical Information Service, 5258 Port Royal Rd., Springfield, Va. 22161. Order No. HRP 0904248. Paperback \$9; \$4 microfiche.

Film on Genital Herpes Arouses Wide Public Interest

■ Recognizing the critical need for public education about genital herpes, the Office of Research Reporting and Public Response, National Institute of Allergy and Infectious Diseases (NIAID), and the National Institutes of Health's Audiovisual Branch have produced "Jennifer: A Revealing Story About Genital Herpes." This 28-minute color film shares the experience of Jennifer, a young woman striving to cope with her case of genital herpes.

Segments of the film have been televised on national network shows and on local television news and public service programs.

The film has been made available to physicians, health facilities, schools,

and civic groups on short-term loans. As of May 1982, the distributor for this film had booked showings to more than 1,500 schools, universities, medical centers, and so forth, throughout the United States.

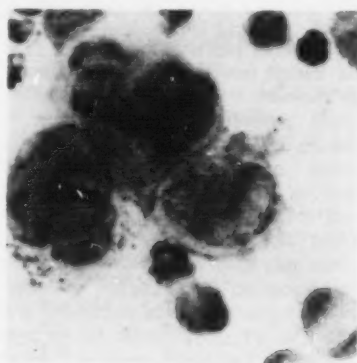
Infection with the virus causing genital herpes is reaching epidemic proportions. Because of a lack of knowledge and understanding of the signs and symptoms of this disease, many people who have it unintentionally transmit it to others.

An estimated 15 to 20 million people are afflicted with this chronic, incurable infection, a number growing by more than 500,000 a year. Genital herpes can be a recurrent, painful, lifelong condition. It affects a person not only physically, but also psychologically, often causing depression,

marital conflicts, and disruptions in social and sexual relationships.

The film about Jennifer takes the viewer through the emotional experience of a person learning that she has genital herpes and finding out what she can do about it. Admitted as a patient in the Clinical Center as a participant in a special research project, Jennifer meets Dr. Stephen Straus, chief of Medical Virology, National Institute of Allergy and Infectious Diseases, and Susan Bachrach, RN, Clinical Center nurse practitioner.

Through conversations with Straus and Bachrach, Jennifer begins to understand the nature of the disease and to come to grips with her anger and psychological turmoil. The film includes interviews with several clinical scientists engaged in genital herpes research and treatment. Interspersed throughout these interviews are short scenes of laboratory work, diagrams, and clinical slides of herpes lesions.



20 million people are infected with the virus causing genital herpes, shown above

New Bacterial Species Named After PHS Scientists

■ Dr. Lloyd G. Herman, a National Institutes of Health (NIH) scientist in the Environmental Services Branch, Division of Research Studies, for more than 20 years, recently shared the honor of having a new bacterial species named after him. He is a member of the American Society for Microbiology. The newly isolated strain will be named *Escherichia hermannii* and is classified as an atypical strain belonging to the biogroup of *Escherichia coli*.

An environmental microbiologist, Herman has pursued organisms similar to this particular bacterial strain, often referred to as yellow-pigmented slow-growing water bacteria, since 1963. He stated that he had taken "hundreds of cultures in and around the NIH campus" and consistently found them in both static and piped water supply systems. Although he officially retired from NIH in 1979, Herman gave a presentation in Brunswick, West Germany, in 1980 on his studies at the International Symposium on Yellow-Pigmented Gram-Negative Bacteria.

The other recipient of the honor of having the new bacterial species named after him is Dr. George J. Hermann, former chief of the Enteric Section, Centers for Disease Control (CDC).

A description by the CDC Bacteriology Reference Branch, in the April 1982 Journal of Clinical Microbiology, states: "Using DNA hybridization, we

showed that many of the atypical strains belong to biogroups of *E. coli*. Biochemistry, frequency, source, and, where available, clinical diagnosis are presented for each of these subgroups. A group of yellow-pigmented KCN-positive, cellobiose-positive strains, formerly called Enteric Group 11 by the Enteric Section, CDC, was shown to represent a new species in the genus *Escherichia*. Thus, the name *Escherichia hermannii* is proposed for this organism."

Although the citation states that Herman was honored for "his many contributions to the study of yellow-pigmented bacteria," he says that he assisted in emphasizing the widespread existence of yellow-pigmented bacteria rather than in the actual isolation or characterization of this particular organism. He isolated the bacteria from water supplies in Canada, England, Germany, Italy, Japan, and Korea.

According to Dr. John J. Farmer III, CDC Bacteriology Reference Branch, Hospital Infectious Program, "Twenty-nine strains of *E. hermannii* have recently been isolated in the United States from a variety of clinical sources." Farmer also indicated that "wounds account for almost 50 percent of these human isolates of *E. hermannii*, followed by sputum or lung isolates (25 percent), and stool isolates (20 percent)."

Jennifer: A Revealing Story About Genital Herpes. Available on short-term, free loan from Modern Talking Pictures, Scheduling Department, 5000 Park St. North, St. Petersburg, Fla. 33709, telephone 813: 541-6661. In color on ¼" videocassette tape, on ½" VHS videocassette tape, on 16 mm film, and on Beta 1 and Beta 2. Available for purchase from Byron Film Laboratory, 65 K Street, N.E., Washington, D.C. 20002, telephone 202: 789-1100. Costs plus shipping are: ¼" videocassette tape \$46.75, ½" VHS videocassette tape \$42.20, 16 mm film \$187.44, and Beta 1 and Beta 2 \$42.20.

education notes

ENT for the primary care practitioner.

An educational program designed for the primary care physician will focus on the most useful and advanced methods of treatment for clinical problems of the ear, nose, and throat. The program will be conducted February 12-19, 1983, in Park City, Utah. A "topic of the day" format will be used to provide in-depth coverage of basic (traditional) ENT (ear, nose, and throat) treatment, trauma and stabilization, common tumors and neurological problems, and the ear

from A to Z. Pediatric aspects of ENT treatment will also be included, and new directions in treatment will be presented, as well as an overview of plastic surgery techniques, a discussion of facial aesthetic surgery, and a pigs feet suture practicum.

Extended Programs in Medical Education of the University of California School of Medicine at San Francisco is presenting the program in cooperation with the school's Department of Otolaryngology and Division of Family

Medicine. The symposium will meet the criteria for 20 hours of ACCME/American Medical Association/CMA, of AAFP, and of ACEP category 1 (formal) continuing education credit.

For further information, contact *Extended Programs in Medical Education, University of California School of Medicine, Rm. 569-U, Third and Parnassus, San Francisco, Calif. 94143, telephone 415: 666-4251.*

Training Courses of the Centers for Disease Control

The Centers for Disease Control (CDC) provide leadership and direction to programs designed to improve the health of the people of the United States by preventing or controlling diseases, improving laboratory performance, assuring safe and healthful working conditions, and responding to health emergencies.

The training services of CDC exist primarily to satisfy the needs of State and local health departments. After this obligation has been fulfilled, services are made available to other Federal agencies, international agencies, private industry and universities, other agencies and organizations, and private individuals.

Application procedures. Applications for courses can be obtained from specific Centers and Program Offices. Applications may also be available from State health departments, and from the Director, Division of Preventive Health Services, in the HHS (Health and Human Services) Regional Offices.

Course credit. The Centers for Disease Control is accredited by the Accreditation Council for Continuing Medical Education to sponsor continuing medical education (CMEs) for physicians. CMEs for Category I are awarded on the basis of 1 hour of credit per hour of instruction. CDC is also a member of the Council on the Continuing Education Unit and awards continuing education units (CEUs) for satisfactory completion of courses. CEUs are awarded on the basis of 1 CEU per 10 hours of instruction. Several professional associations in the laboratory sciences have independently accredited CDC laboratory courses for CEUs.

Courses available. The table shows the CDC training courses (a) for which application must be made before specified dates in the period November 1, 1982-June 30, 1983, or (b) when there is no closing date, those for which the course dates fall within this period. Each course is listed under its CDC sponsor. All courses are held in Atlanta, Ga., unless otherwise noted.

CDC calendar of training courses

Title and number	Course dates	Application deadline
International Health Program Office (telephone 404: 329-3336)		
Epidemiology and Public Health Administration in Disease Control	June 13-July 1, 1983	May 13, 1983
Laboratory Improvement Program Office, Laboratory Training and Consultation Division (telephone 404: 329-3837 or FTS 236-3837)		
Bacteriology		
Laboratory Methods in Anaerobic Bacteriology (8370-C)	June 6-17, 1983	April 11, 1983
Laboratory Diagnosis of Bacterial Foodborne Diseases (8350-C)	Jan. 10-21, 1983	Nov. 15, 1982
Laboratory Methods in Clinical Bacteriology (8380-C)	Feb. 7-18, 1983	Dec. 13, 1982
Laboratory Methods in Enteric Bacteriology (8500-C)	Mar. 14-25, 1983	Jan. 17, 1983
Environmental Aspects of Hospital Infection Control (3910-C)	Apr. 12-15, 1983	Feb. 14, 1983
Clinical Microbiology in Control of Nosocomial Infections (8336-C)	May 23-27, 1983	Mar. 28, 1983
Laboratory Methods for Detection of Legionnaires' Disease Agents (8335-C)	June 27-July 1, 1983	May 2, 1983

CDC calendar of training courses—Continued

Title and number	Course dates	Application deadline
Laboratory Methods in Medical Mycobacteriology (8550-C)	July 11-22, 1983	May 16, 1983
<i>Cytology</i>		
Clinical Cytopathology Workshop (8269-C)	Feb. 28-Mar. 4, 1983	Jan. 3, 1983
<i>Hemoglobinopathy</i>		
Basic Laboratory Methods for Detecting Hemoglobinopathies (8983-C)	May 16-19, 1983	Mar. 21, 1983
<i>Immunology</i>		
Principles and Techniques for Enzyme Immunoassay (9418-C)	Apr. 18-21, 1983	Feb. 21, 1983
Qualitation and Quantitation of Immunoglobulins (9446-C)	Feb. 28-Mar. 4, 1983	Jan. 3, 1983
Principles and Techniques for Radioimmunoassay (9436-C)	Mar. 28-Apr. 1, 1983	Jan. 31, 1983
Intermediate Immunohematology (9427-C)	May 23-26, 1983	Mar. 28, 1983
Serodiagnosis of Mycotic Diseases (9430-C)	June 6-17, 1983	Apr. 11, 1983
<i>Mycology</i>		
Introduction to Basic Medical Mycology: No. 1 (8125-C)	Jan. 24-Feb. 11, 1983	Nov. 29, 1982
Laboratory Methods for Dermatologic Mycology (8153-C)	Apr. 4-8, 1983	Feb. 7, 1983
Introduction to Basic Medical Mycology: No. 2 (8126-C)	July 18-Aug. 12, 1983	May 23, 1983
<i>Parasitology</i>		
Laboratory Methods in Medical Parasitology: Part I Intestinal Parasites (8000-C)	Apr. 4-22, 1983	Feb. 7, 1983
Laboratory Methods in Medical Parasitology: Part II Blood Parasites (8010-A-C—Malaria only)	Apr. 25-29, 1983	Mar. 7, 1983
Laboratory Methods in Medical Parasitology: Part II Blood Parasites (8010-C—Malaria and other blood parasites)	Apr. 25-May 6, 1983	Feb. 28, 1983
Laboratory Methods in Intestinal Protozoa (8002-C)	Aug. 15-26, 1983	June 20, 1983
<i>Venereal Diseases</i>		
Microhemagglutination Assay: Methods for Detecting Antibodies to Syphilis (4660-C)	Mar. 28-30, 1983	Jan. 31, 1983
Fluorescent Antibody Methods in the Diagnosis of Syphilis (4650-C)	May 16-18, 1983	Mar. 31, 1983
	Mar. 14-25, 1983	Jan. 17, 1983
Laboratory Methods for Identifying <i>Neisseria gonorrhoeae</i> (4620-C)	Feb. 23-25, 1983	Dec. 27, 1982
	Apr. 20-22, 1983	Feb. 21, 1983
Laboratory Methods for Detecting Sexually Transmitted Diseases (4625-C)	Feb. 28-Mar. 2, 1983	Jan. 3, 1983
Darkfield Microscopy for Identifying <i>Treponema pallidum</i> (4590-C)	Mar. 3-4, 1983	Jan. 3, 1983
	May 5-6, 1983	Mar. 7, 1983
Current Laboratory Methods for Detecting Syphilis (4540-C)	Mar. 7-11, 1983	Jan. 10, 1983
	May 9-13, 1983	Mar. 14, 1983
<i>Virology</i>		
Basic Laboratory Methods in Virology (8200-C)	Mar. 14-25, 1983	Jan. 17, 1983
Laboratory Diagnosis of Viral Diseases (8241-C)	Jan. 24-Feb. 4, 1983	Nov. 29, 1982
Laboratory Diagnosis of <i>Chlamydia trachomatis</i> Infections (8238-C)	Feb. 14-18, 1983	Dec. 20, 1982
Laboratory Methods for Arbovirology (8250-C)	Apr. 11-15, 1983	Feb. 14, 1983
Ecology and Control of Arboviruses that Cause Disease in Humans (8235-C) (held in Ft. Collins, Colo.)	Apr. 25-29, 1983	Feb. 28, 1983
Basic Laboratory Techniques for Cell Culture (8270-C)	May 2-6, 1983	Mar. 7, 1983
Laboratory Diagnosis of Mycoplasma Infections (8226-C)	July 25-29, 1983	May 30, 1983
Center for Environmental Health (telephone 404: 464-6641)		
Urban Rat Control	Upon request (field and headquarters).	None.

CDC calendar of training courses—Continued

[illegible]

CDC calendar of training courses—Continued

<i>Title and number</i>	<i>Course dates</i>	<i>Application deadline</i>
	<i>Cincinnati</i>	
	Dec. 13-17, 1982	None.
	Mar. 21-25, 1983	None.
	June 20-24, 1983	None.
	<i>Dallas</i>	
	Feb. 7-11, 1983	None.
	<i>Nashville</i>	
	Feb. 28-Mar. 4, 1983	None.
	<i>San Juan</i>	
	Nov. 1-5, 1982	None.
	Apr. 4-8, 1983	None.
	<i>Seattle</i>	
	Nov. 15-19, 1982	None.
	Feb. 7-11, 1983	None.
	Apr. 18-22, 1983	None.
	June 20-24, 1983	None.
	Feb. 8-10, 1983	None.
Sexually Transmitted Disease Education: Diagnosis, Planning, and Evaluation (0144)		
Sexually Transmitted Disease Update for Clinicians (7008-D) 16 CMEs	<i>Baltimore</i>	
	Nov. 11-12, 1982	None.
	Jan. 6-7, 1983	None.
	Feb. 3-4, 1983	None.
	May 19-20, 1983	None.
	<i>Chicago</i>	
	Mar. 3-4, 1983	None.
	Apr. 7-8, 1983	None.
	June 9-10, 1983	None.
	<i>Cincinnati</i>	
	June 16, 1983	None.
	<i>Dallas</i>	
	Nov. 5-8, 1982	None.
	<i>Los Angeles</i>	
	Apr. 23-30, 1983	None.
	<i>Nashville</i>	
	May 1-2, 1983	None.
	<i>San Juan</i>	
	Nov. 16-17, 1982	None.
Sexually Transmitted Disease Update for Public Health Advisors (7008-D)	<i>Nashville</i>	
Supervisory Venereal Disease Seminar (0472)	Mar. 24-26, 1983	None.
	Dec. 6-10, 1982	None.
	Mar. 28-Apr. 1, 1983	None.
	June 6-10, 1983	None.
	Apr. 25-29, 1983	Feb. 25, 1983
Tuberculosis Today! (1013-H) 18 CMEs	Upon request.	None.
Venereal Disease Counseling/Interviewing (4310-D)	Scheduled as needed in Atlanta, Chicago, Dallas, Los Angeles, and New York.	None.
Venereal Disease Epidemiology I-II: Introduction to Case-finding and Case Management (4683-D)	Upon request.	None.
Venereal Disease Epidemiology III: Advanced Interviewing Seminars (4351-D)		
	Center for Professional Development and Training (telephone 404: 262-6663)	
Applied Epidemiology (4440-G) 4.0 CEUs	May 11-20, 1983	None.
Surveillance, Prevention and Control of Nosocomial Infections (1200-G) (200+ bed hospitals) 5.0 CEUs	1983 (to be announced).	
Surveillance, Prevention and Control of Nosocomial Infections in Small Hospitals (less than 200 beds) (1200-G) Part II 2.4 CEUs	1983 (to be announced).	

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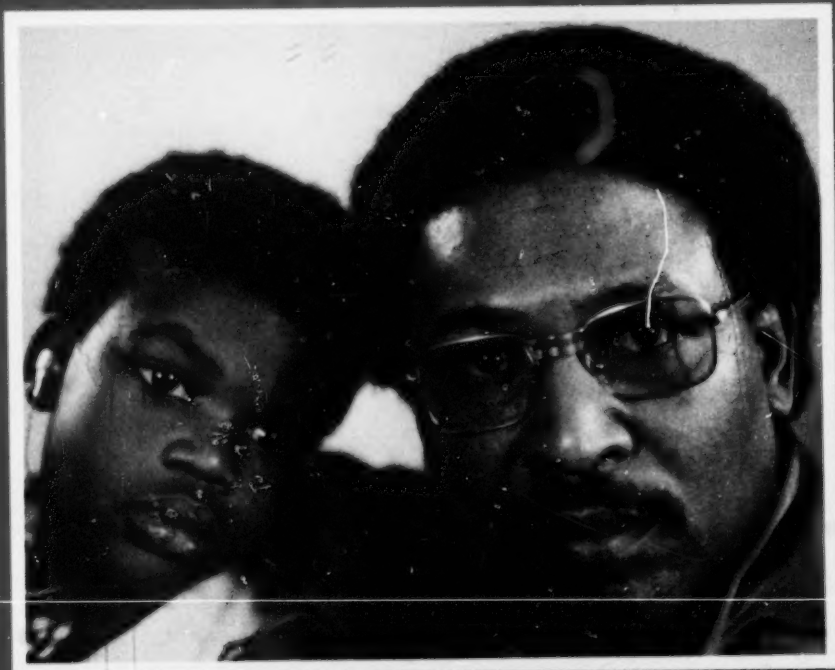
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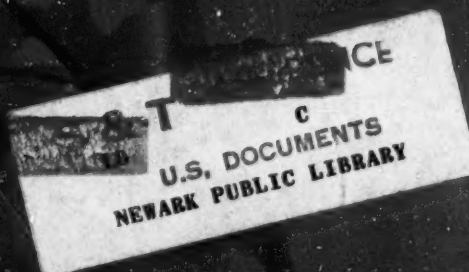


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PUBLIC HEALTH **reports**

VOLUME 97 NO. 6 NOVEMBER-DECEMBER 1982



The Healthy Mothers,
Healthy Babies Promotion Campaign

HE20.6011:

The Importance of Promoting Healthful Behavior Among Pregnant Women

Although infant mortality in this country is lower than it has ever been, there has been relatively little change in birth weight distribution over the past 15 years. The lower the birth weight, the greater the infant's chances of death, serious congenital anomalies, or other serious impairments. Therefore, further progress in improving infant mortality rates and infant health will largely depend on a reduction in the incidence of low birth weight infants. At the time of the publication of "Healthy People," the infant mortality was 13.2 per 1,000 live births. By April 1982, it was 11.1. The goal by 1990 is 9.

This reduction in infant mortality is one of the Surgeon General's Health Objectives for the nation. More than 500 individuals and organizations from both the private and government sectors helped to decide on these objectives. Achieving them will require action by all sectors of American society. Not only health professionals and their patients but also industry and labor, voluntary associations, schools, churches, consumer groups, health planners, and public officials have an important role to play.

This is especially true for the objective of improving infant health. Given current medical knowledge, high quality prenatal care beginning early in pregnancy holds the great-

est promise for improvement. This care includes counseling the pregnant woman about the effects on her baby of diet, smoking, alcohol, and medications and encouraging her to make necessary changes in her health behavior to help assure a healthy baby. Motivating the pregnant woman to make these sometimes difficult changes requires counseling by her health care provider, but it also requires community action and family support to help her to sustain changes in health behavior.

The most striking difference in birth weights of U.S. infants is that between black and white babies. Black infants are about two and one-half times as likely as white infants to be of very low birth weight (1,500 grams or less), and two times as likely to be of low birth weight (2,500 grams or less).

Many factors contribute to such differences, including personal health habits. For example, maternal smoking and alcohol consumption, associated with reduced birth weight, are more common among women with fewer than 12 years of education. We need better methods of reaching these women, and we must persuade their health care providers to do more to encourage their patients' healthful behavior.

The Surgeon General's Workshop on Infant Mortality in December 1980 set the stage for action to improve infant health. Out of that workshop came a call for concerted

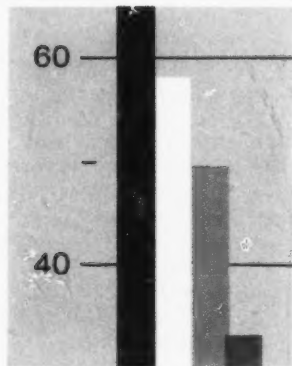
effort that resulted in the formation of the Healthy Mothers, Healthy Babies Coalition. The coalition has more than 50 national members, including health professional, voluntary, and governmental agencies, joined to increase the public understanding of health risks to pregnancy and to motivate pregnant women and women planning a pregnancy to take action to protect their health, obtain regular prenatal care, and seek other assistance when needed. This issue of *Public Health Reports* includes a description of the coalition and its plans to work together through regional, State, and community channels. For this Department, it is especially appropriate that we participate fully in coalition activities as one facet of our strong commitment to health promotion and disease prevention. A list of coalition members appears on page 509. I strongly encourage the readers of this journal to contact one of these groups to become a part of this important public health effort. The future good health of this nation depends upon the health of its children. And they depend on us.

C. Everett Koop, MD, ScD
Surgeon General

DEC 23 1982

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Official Journal of the U.S. Public Health Service



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Address correspondence to:
Editor, *Public Health Reports*
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Cover: Helping to promote the Healthy Mothers, Healthy Babies campaign are the posters which appear on the front cover and the inside back cover of this issue of *Public Health Reports*. The posters, with messages in English or Spanish, are being distributed to neighborhood health centers and other facilities that provide health care for low-income women. On page 509 is an order blank for the series of six posters. The lead article in this issue describes the 50-member public-private coalition of organizations that is working to lower infant mortality and improve maternal and infant health.

Healthy Mothers, Healthy Babies Coalition— A Joint Private-Public Initiative

ELAINE B. BRATIC



FEWER THAN 9 DEATHS PER 1,000 LIVE BIRTHS and continuing improvement in maternal and infant health is the 1990 goal for pregnancy and infant health in the United States proposed in "Promoting Health/Preventing Disease—Objectives for the Nation" (1). To achieve the goal, more than 50 organizations with national constituencies and local affiliates have begun working together.

Background

During the 9 months preceding birth, when the fetus is the most vulnerable, both mother and child need to be protected. The principal threats to the survival of the infant and its subsequent good health are low birth weight and congenital birth defects. Two-thirds of all those who die in infancy are of low birth weight (2). Congenital abnormalities, including those of genetic origin, a severe environmental insult in utero, or a birth injury, are also responsible for early deaths or poor health. In addition, low birth weight is associated with increased occurrence of mental retardation, growth and developmental disorders, and disorders of the central nervous system.

Ms. Bratic is Deputy Director of the Office of Public Affairs, Office of Assistant Secretary for Health, Room 721 H, HHH Building, 200 Independence Ave. SW, Washington, D.C. 20201. Tearsheet requests to Ms. Bratic.

Reducing the incidence of low birth weight and birth defects through intervention with the mother before and during pregnancy is being given high priority by medical and public health leaders in the United States. Although how to prevent low birth weight is not completely understood, a number of factors—diet; social and economic status; marital status; the age of the mother; use of alcohol, cigarettes, and drugs; and use of prenatal health services—affect birth weight and health of the mother and child. For example, black women and teenagers, those who are at greatest risk of delivering a low birth weight infant, are least likely to obtain any or early prenatal care.

Reducing the incidence of congenital abnormalities requires genetic counseling to identify the risk status of the parents and establishing prenatal diagnoses for those women at risk. Diagnostic testing is presently limited to a small number of inherited conditions, but testing services are available for high-risk groups once vulnerability has been identified. Environmental hazards that can cause congenital defects include radiation, drugs (including medications), alcohol, infectious agents, and workplace and household exposures to toxic and teratogenic substances. Although the period of greatest danger is the early weeks of fetal development, even before a woman realizes she is pregnant, it is im-

portant to avoid these hazards throughout pregnancy as much as possible.

In September 1981, a Healthy Mothers, Healthy Babies organizational conference brought together representatives of more than 36 national voluntary, professional, and government organizations to discuss combining their interests and resources to improve the quality and reach of public and professional education relating to prenatal and infant care. The conference was co-sponsored by the American College of Obstetricians and Gynecologists, American Academy of Pediatrics, American Nurses Association, March of Dimes, National Congress of Parents and Teachers, and the Public Health Service. At that conference, Richard S. Schweiker, Secretary of Health and Human Services, said that "by pulling together all our resources and energies, we can make 'healthy mothers' a far-reaching, truly national effort. By joining forces we'll reinforce the trend of the last 10 years." Out of that conference grew the Healthy Mothers, Healthy Babies Coalition, a result of the organizations' enthusiasm about working together in a long-term effort aimed at improving maternal and child health. This partnership of government, professional, and voluntary organizations and agencies is designed to increase the awareness of pregnant women about the importance of good health for themselves and their unborn babies.

Achievement of this goal of health depends largely on provision of high-quality prenatal, obstetrical, and neonatal care; of preventive services during the first year of life; education of health professionals; and broad public information activities aimed at pregnant women and their families. Coalition members recognize that these efforts all require a long-term commitment of interest and resources. Although the coalition acknowledges the primary importance of delivering the health services, its purpose is to improve the quality and reach of public education concerning prenatal and infant care. Coalition members agree to work toward this goal both through the activities of their respective organizations and through collaborative efforts undertaken by the coalition.

An important activity of the coalition will be to devise better methods of sharing information, especially about educational materials and programs that prove effective. In addition to the information exchange, the coalition's member agencies will seek opportunities to work together in disseminating materials through many channels to relevant target audiences—pregnant women, women planning pregnancy, teenagers, fathers and other family members, and minorities. Finally, in a time of limited resources, the coalition will organize

efforts to share the production of high-quality print, broadcast, and film materials.

The coalition is an informal association that has grown to include more than 50 groups with shared goals but with no dues or formal membership requirements. All national members meet these criteria:

- a charter, purpose, or constituency that is national in scope or broadly represents a special population group or groups and has a significant commitment to prenatal or infant care, or both;
- a structure of State or local affiliates or another type of network to reach constituents at the regional, State, or local level;
- a commitment to make this network available to help disseminate materials and information about "Healthy Mothers, Healthy Babies."

The steering committee for the coalition met first on March 23, 1982, to chart future activities for this partnership. Between quarterly steering committee meetings, three subcommittees meet to develop coalition policy, explore networking opportunities between national and local coalition affiliates, and encourage joint development of educational materials. National members are kept informed of coalition progress through a quarterly newsletter published by the American College of Obstetricians and Gynecologists; local chapters of member organizations receive the newsletter through their national offices.

Cooperative Ventures

Currently, coalition members are cooperating in the following activities.

- A series of resource packages have been prepared by the Department of Agriculture (USDA), Department of Health and Human Services (DHHS), and the March of Dimes. The packages, prepared for staff of health, food assistance, and other related nutrition programs, focus on the special needs, interests, and lifestyles of teenagers. The packages include lesson plans for pregnant teenagers, posters, and booklets, and are available to State agencies administering the Women, Infants, and Children programs.
- A national breast feeding promotion effort is being directed to health providers, expectant mothers, and the general public. Two Federal departments, USDA and DHHS, have joined forces with six professional organizations and several voluntary agencies to promote the practice of breast feeding. The goal is to increase the proportion of mothers who breast feed their infants at hospital discharge from 45 percent to 75 percent and, at 6 months of age, from 21 percent to 35 percent. The lack of knowledge among health care providers, the

lack of widely available information for the public, and weak or nonexistent support systems will be addressed by distributing professional and public educational materials. A teleconference at approximately 100 sites on breast feeding and infant and maternal nutrition will introduce the campaign to health professionals.

- A campaign has been launched to promote the use of seatbelts among expectant mothers. The leading cause of death of pregnant women in the United States is automobile accidents (2,3). The American College of Obstetricians and Gynecologists (ACOG), U.S. Department of Transportation, Nurses Association of the American College of Obstetricians and Gynecologists (NAACOG), and the American Academy of Pediatrics (AAP), have joined to prepare materials and information for the 55,000 physicians and nurses who work with expectant mothers and young children. ACOG and NAACOG will work with AAP and other groups at the local level to reach physicians and other health professionals who could speak to groups on the need to use seatbelts during pregnancy.

- A series of posters and information cards for clinics serving low-income, new or expectant mothers will be issued. Six posters and accompanying cards, in English and Spanish, will cover nutrition, smoking, breast feeding, alcohol, use of medications, and the importance of regular medical care. Clinics that subscribe to the series receive a new poster and a supply of postcard-size health cards every 2 months. (Examples of the posters appear on the front cover and inside back cover of this issue of *Public Health Reports*.) Sponsors include the Public Health Service, American College of Obstetricians and Gynecologists, March of Dimes, Licensed Beverage Information Council, and Gerber Foods.

- Public service radio spot announcements, in English and Spanish, with the Healthy Mothers, Healthy Babies theme featuring the Surgeon General of the Public Health Service, Dr. C. Everett Koop, were jointly produced and distributed by the Service and the March of Dimes.

- A series of six newspaper columns in English and Spanish on prenatal care were authored by the Surgeon General. Similar columns were produced by the Public Health Service with the National Medical Association and the National Newspaper Publishers Association for black newspapers. Also, Gerber Products is asking editors of consumer magazines to print information on good prenatal care.

- The Public Health Service and other coalition members will jointly produce a prepackaged television show on prenatal care suitable for local origination.

- A directory of educational materials on prenatal and infant care produced by coalition members has

been published to help assure that organizations can share resources and to identify gaps in existing materials (4). The directory lists printed and audiovisual materials designed for the general public and health professionals. Notices of new materials appear in the coalition newsletter, and the newsletter also carries reports on new local or national educational programs, conferences, and ideas.

Public Health Service Contributions

Recognizing the need to alert pregnant women (and women planning a pregnancy) to the risks that they may face, a number of Public Health Service agencies have highlighted pregnant women as target audiences for their communications projects. Descriptions of some representative projects follow.

Smoking. The Surgeon General's 1980 report to Congress (5) was devoted to the health consequences of women's smoking, including the special risks to the fetus. Public information activities, primarily through the mass media, continue through the Service's Office on Smoking and Health.

Fetal alcohol syndrome (FAS). Evidence that moderate use of alcohol can result in fetal anomalies (as well as the established risk from excessive use), prompted the leaders of the National Institute on Alcohol Abuse and Alcoholism to launch a national program to reach pregnant women through the mass media and community channels. The FAS program, conducted through State and local organizations, uses a variety of materials including television spots in English and Spanish to deliver the message that it is best not to drink during pregnancy. (In addition, a number of States are continuing their own FAS campaigns.)

Use of medications. The Food and Drug Administration has distributed print and broadcast materials advising pregnant women to consult their physicians before using any over-the-counter or prescription drug.

Reproductive effects of exposure to hazardous substances. The National Institute for Occupational Safety and Health, in cooperation with the American College of Obstetricians and Gynecologists, is putting together a program designed to increase awareness of these substances.

Healthy mothers and sexually transmitted diseases (STD). The Centers for Disease Control have many educational and screening programs addressed to health professionals and the public. Activities are underway in national voluntary organizations, and school curricular materials on STDs are being readied.

Maternal and infant nutrition. The Office of Maternal and Child Health (OMCH), USDA, and March

of Dimes have produced information resource packets for nutritionists and other professionals. With these and other coalition members, the Office is developing a national campaign promoting breast feeding.

Staff of the Assistant Secretary for Health track these categorical programs, link them with the coalition members and their activities, conduct market research to encourage more effective targeting to pregnant women and those planning a pregnancy, and are developing an "umbrella" campaign.

Messages and Target Audiences

This Healthy Mothers umbrella campaign emphasizes the positive steps a pregnant woman can take to help herself and her new baby. Messages about eating proper foods, exercising, and other actions can offer more encouragement and incentive for a woman than telling her what *not* to do. This total health promotion effort is needed to explain all of the risks that the woman faces and help her identify which risks apply to her. The process of personalizing health recommendations may be very important to a woman who is deciding to take the next (action) step. In addition, winnowing out those risks that do not apply helps to prevent her from developing an overwhelming sense of loss of control. The purpose is to emphasize the personal control—and responsibility—a woman has over her health.

Because the 9 months of pregnancy is finite, and a woman has more incentive at this time to adhere to health advice, this period can be an ideal intervention point for modifying health behavior. Healthful habits started during pregnancy may be continued, given proper reinforcement and reward. Further, the umbrella campaign provides the opportunity for addressing—in perspective—new risks and new advice as knowledge becomes available. The public is confused as a result of myriad reports of new health risks—some vital to health status, some extremely remote risks. The umbrella campaign is designed to help a woman understand relative risks and to combat the fatalism resulting from too many negative health reports.

Messages in the Healthy Mothers, Healthy Babies campaign are based on the preventive services for the pregnant woman recommended in "Healthy People," the Surgeon General's 1979 report on health promotion and disease prevention (2). These services include history taking, physical examination, laboratory tests, and counseling, with referrals made as necessary and desired. The information messages address issues which the woman largely can control—the importance of regular prenatal care; nutrition before conception and during pregnancy; cigarette smoking; use of alcohol, drugs and caffeine; avoidance of X-rays and environ-

mental risks; signs of abnormal pregnancy; physical activity and exercise; preparation for labor and delivery; nutrition of the infant (including breast feeding); and preparation for infant care (including obtaining a safe car-restraining device and having the child immunized).

Specific messages are tailored to each target audience, based on the level of knowledge and attitudes toward health and pregnancy, lifestyle, and the kinds of information these women are most eager to obtain. Although some messages in this campaign are directed at all pregnant women, special attention is devoted to reaching at least three groups especially at risk: women with a known medical risk (genetic, chronic disease, over 35 years old); women in the lower socioeconomic groups; and pregnant teenagers.

Women medically at high risk. Infants born to women with toxemia and uterine infections have a mortality rate four to five times higher than others (2). For mothers with such medical conditions as diabetes, hypertension, or kidney or heart disease, there is a higher risk of bearing babies who will not survive their first year or be severely impaired, risks which early competent medical care can reduce. Sexually transmitted diseases can cause abortion, congenital defects, neonatal deaths, and maternal morbidity and deaths. Certain birth defects, such as severe brain and spinal cord defects and Down's syndrome, can sometimes be anticipated in high-risk women.

Women with known medical risks need special information that may best be interpreted and delivered by a health professional. And, in most instances, these women should know about their risks before becoming pregnant.

Women socially at high risk. Maternal and infant mortality records show striking demographic variations that were cited in "Healthy People" (2):

The maternal mortality rate for blacks was about three times that for whites in 1976;

Infant mortality for the total population was 13.0 per 1,000 live births in 1979; the rate for black infants was 92 percent higher than for whites in 1978;

Infant mortality rates for individual States ranged from 9.5 to a high of 18.2 in 1977;

Infant mortality rates for major cities in 1977 ranged from 10.0 to 27.4; 22 of the 26 major cities had higher rates than the national average of 14.1 in 1977.

Many infants in the United States are born to women who are poorly prepared for childbearing: in 1976, at least 29 percent of women giving birth made no prenatal visit during the first trimester, and 6 percent had had no prenatal care during either of the

first 2 trimesters. Yet, about 80 percent of women at high risk of having a low birth weight infant can be identified in the first prenatal visit, and action can be taken to reduce the risk.

Poor nutrition is a possible correlate of low birth weight. Nutritional supplementation programs (such as the Special Supplemental Food Program for Women, Infants, and Children) may help ensure a better pregnancy outcome. Data from developing countries suggest that an adequate diet during the last weeks of pregnancy may even be able to offset the effects on the birth weight of earlier severe dietary deficiencies (6).

An analysis of birth weight distribution according to socioeconomic status reveals a clear relationship between birth outcomes and socioeconomic background; the birth weight of black infants of higher socioeconomic status is comparable to that of whites (2). Further, where prenatal care services, diet supplementation, income support, minimum housing, and other social services are accessible, information programs can contribute to the total population's broader awareness of these services (and tell women where services are available). Clearly, education alone cannot correct socially influenced problems that lead to high-risk pregnancies.

Women planning a pregnancy. Even before they become pregnant, women need to know about factors that may affect the health of their future babies. Providing information about risks of using cigarettes, alcohol, and drugs is an important part of prenatal care, but many women are pregnant for several weeks before knowing that they are, and it is at the very early stages that the fetus is the most vulnerable. Early on, too, the fetus can be affected by toxic chemicals and infectious agents. Moreover, exposure to ionizing radiation above a certain level in the first week or two of pregnancy increases the risk of spontaneous abortion, and subsequent exposures, especially during weeks two through six, increase the risks of malformations and some childhood cancers, including leukemia.

Family planning involves more than the question of when to have a child; for some people, the question is whether. Couples at high risk of conceiving a child with an inherited disorder may wish to consider whether to have children. Carriers of the trait for sickle cell anemia, Tay-Sachs disease, or hemophilia can be detected through analysis of blood samples. Women with chronic diseases, such as diabetes, coronary artery disease, kidney disease, or hypertension, are at special risk and need to be aware of their extra care requirements before becoming pregnant. Women in hazardous occupations need to know the special dangers they face.

And all women planning a pregnancy should be certain that they are protected against rubella.

Teenagers. One of five infants is born to a teenage woman. Fewer than one-third of the births to women ages 15 to 19 years are wanted when they occur; therefore, for sexually active teenagers, the primary effort should be on the prevention of unwanted pregnancy.

Infants born to young teenagers have a low birth weight incidence about 1.5 times the national average. The 1977 proportion of premature delivery for mothers under 15 was 24.3 percent, almost 3 times the national average of 8.8 percent (2). Thus, prenatal advice and supervision are especially important for teenagers, yet they are less likely than any other age group to start care in early pregnancy. Part of the explanation for this failure may be that 85 percent of the very young mothers are not married (2), and therefore they may delay facing the fact of their pregnancy. Counseling and outreach programs are needed to teach them the importance of early prenatal care and to help them deal with their situation.

In addition to these groups of women, other target audiences include spouses and "concerned others," health professionals, health teachers, and school nurses.

Health professionals. Surveys of the American public repeatedly show that physicians are considered the best sources for health information. Yet, the same surveys suggest that physicians do not provide as much information to their patients as their patients want. For any woman already in the health care system, the health professional should be the best source of information regarding her pregnancy because the information will be trusted, relevant, and delivered directly, and it can be reinforced or reexplained during subsequent contacts.

Within the community of health professionals, primary communication efforts are addressed to obstetricians-gynecologists, family planning clinics, family physicians, neighborhood health centers, pediatricians caring for adolescents, nurses, nurse-midwives, school nurses, and pharmacists. Messages aimed at health professionals inform them about the campaign, remind them of the importance of counseling pregnant patients, encourage them to discuss with patients the special care needed, and offer the health professionals materials to give patients that reinforce counseling.

Health and home economics teachers and school nurses. The school is a clear and direct route for transmitting health information to the majority of teenage girls. Appropriate ways of incorporating Healthy Mothers messages (for future mothers) and materials into

health curriculums and other school programs are being investigated by the Public Health Service. Some possible settings are the school lunchroom, the athletic program, and before school and after school clubs.

Spouses and concerned others. The effect of many health decisions on a loved one or the loved one's opinion of a health action may have a significant impact on an individual's decision to take action. A spouse's concern about a pregnant woman's health and the health of a new baby may play a major role in helping form a woman's decision or reinforcing that decision. Therefore, partners are clearly an audience for health information. The extent of their influence and the roles of "significant others," such as parents and friends, are being explored as a part of the market research that underlies strategies for the Healthy Mothers campaign.

Market Research for Campaign Development

The national Healthy Mothers, Healthy Babies campaign is being guided by market research conducted by the Office of the Assistant Secretary for Health. The aim of this research has been to determine the most efficient ways to reach women of childbearing years and, especially, women of low socioeconomic status with prenatal care information. First, secondary data about the following issues were reviewed:

- What sources of health information and credible health spokespersons are relied on by lower socioeconomic groups?
- What are credible sources of, and spokespersons for, nonhealth information among lower socioeconomic groups?
- What are potential points of access to these groups (the media, family and friends, the health provider system)?
- Are the effective strategies for reaching urban women similar to or different from those for rural women? For teenagers compared to mature women? For blacks and Mexican Americans? For monolingual and bilingual women?
- What kinds of health information or health education does the target audience want?
- What factors motivate the target audience to seek health information or health care?

Following this review, a series of 15 focused group interviews were conducted to explore the present knowledge and sources of prenatal care; the utility of materials, information, and services that are available; and possible channels of communication that might be used to motivate these women to participate more fully in

the health care system. Because of limited resources, these investigations were confined to Mexican American and black women of childbearing age. In addition, interviews were conducted with health care providers to ascertain their opinions on the information needs of the target population and their assessment of the effectiveness of current health promotion messages and distribution channels (7). Finally, an analysis of mass media use by women of childbearing age was undertaken to determine which media channels could be used to reach the target audiences (8).

Continuing Healthy Mothers, Healthy Babies activities of the Public Health Service will largely be directed by coalition consensus. Gaps in current prenatal education programs became apparent with the publication of the coalition bibliography. Work to fill these gaps will be undertaken by the Public Health Service along with other coalition members. It is this joint review, planning, production, and promotion that will permit the most efficient use of resources, including the valuable linkages that coalition members maintain within local communities. It is this kind of cooperation that will reinforce public recognition of the importance of good health care during pregnancy. Only with the combined forces of the professional, voluntary, and government coalition members can we begin to reach our 1990 health objective for the nation.

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Healthy Mothers, Healthy Babies Coalition Members

- *Accident Prevention Rehabilitation Institute
- *Alliance for Perinatal Research and Services
- *American Academy of Pediatrics
- *American Association for Automotive Medicine
 - American Association of School Administrators
 - American College of Nurse-Midwives
- *American College of Obstetricians and Gynecologists
- *American Dietetic Association
 - American Home Economics Association
 - American Hospital Association
- *American Nurses Association
 - American Public Health Association
- *American Red Cross
- *American Society for Psychoprophylaxis in Obstetrics
 - Arlington County Department of Human Resources, Preventive Health Unit
 - Association for the Care of Children's Health
 - Boston Women's Health Book Collective
- *California Urban Indian Health Council, Inc., representing the American Indian Health Care Association
 - Center for Consumer Health Education
 - Child Welfare League of America
 - Future Homemakers of America
 - Harvard Community Health Plan
 - Health Care Financing Administration
 - Health Education Associates, Inc.
 - Highland General Hospital, Gynecology and Obstetrics Department
 - Institute for Health Policy Studies
- *International Childbirth Education Association, Inc.
 - Kansas City Health Department
- *La Leche League, International
 - Maine Department of Human Services, Division of Child Health
- *March of Dimes
 - Metro Council of Associations for Retarded Citizens, representing the national association
 - Military Family Resource Center
 - Nassau Hospital
 - National Association of Parents and Professionals for Safe Alternatives for Childbirth
 - National Association of State Boards of Education
- *National Catholic Educational Association, Special Education Department
 - National Center for Clinical Infant Programs
 - National Child Nutrition Project
- *National Committee for Adoption
- *National Congress of Parents and Teachers
- *National Council of Catholic Women
- *National Medical Association
- *National Perinatal Association
 - Nurses Association of the American College of Obstetricians and Gynecologists
 - New Jersey Hospital Association
- *Planned Parenthood Federation of America
- *Salvation Army
 - Society for Adolescent Medicine
- *Society for Nutrition Education
- *U.S. Department of Agriculture
- *U.S. Jayceettes
- *U.S. Public Health Service, Department of Health and Human Services
 - University of South Carolina, Department of Health Education, School of Public Health
 - Urban Institute
- *Virginia State Health Department, representing the Association of State and Territorial Health Officers
 - YWCA National Board
- *Steering Committee members.

The Multiplier Effect of the Health Education-Risk Reduction Program in 28 States and 1 Territory

MARSHALL W. KREUTER, PhD
GREGORY M. CHRISTENSEN, PhD
ANGELA DIVINCENZO, MS



CHRONIC DISEASES AND ACCIDENTS have replaced communicable diseases as the primary contributors to mortality, morbidity, years of life lost, and the spiraling costs of medical expenses; consequently, efforts to promote health and prevent chronic conditions are being scrutinized (1,2). The hope is, of course, that there is measurable truth in Ben Franklin's intuitive logic that "an ounce of prevention is worth a pound of cure."

The Health Education-Risk Reduction (HE-RR) Grants Program of the Public Health Service has constituted an unprecedented Federal effort to demonstrate the validity of Franklin's aphorism. Under the authority of Public Law 94-317, The Health Information and Health Promotion Act of 1976, the HE-RR grants program was conceived to provide economic support to States and Territories for establishing an organized approach to health education.

Funds for the HE-RR grants were made available through two distinct funding programs. Initially, a limited amount of money was made available through the Centers for Disease Control (CDC) to establish State-Level Risk Reduction Programs. The State level program would function as the primary unit in formulating an organized approach to health education,

health promotion, and risk reduction programs within the individual States and Territories.

The intent of CDC funding for State level programs was to give States needed economic support and technical assistance to increase the likelihood of eventually successful interventions. From the outset it was clear that these Federal funds were designed to help the 50 States and 4 Territories establish a sound foundation for health promotion efforts; monies would eventually be withdrawn or greatly reduced. It was assumed that by establishing an organized approach at the State level, support for health promotion programs would continue through the coordinated efforts of public, private business, and nonprofit groups. It was further assumed that such a strategy would not only generate spinoff health promotion programs for communities but also would reduce duplication of services; such a coordinated plan was likely to result in a more efficient use of increasingly scarce financial resources. Followup evaluation measuring the validity of these assumptions is now underway.

Within the framework of this approach to risk reduction, a second set of grants was made available to local communities for special intervention projects. Proposals sought under this solicitation for Federal funds were to focus on creative interventions designed to reduce behavioral risk factors; primary emphasis was placed on efforts that addressed tobacco use and alcohol abuse among youth. It should be noted that awards for the local level intervention projects were made on the basis of merit after a formal technical review. Projects were not prorated to States and Territories; however, States were encouraged to solicit proposals

At the time of the study, Dr. Kreuter was chairman, Department of Health Education, College of Health, University of Utah, Salt Lake City. He is now a Visiting Scientist with the Center for Health Promotion and Education, Centers for Disease Control, Atlanta, Ga. 30333. Tearsheet requests to Dr. Kreuter.

The other authors were with the Department of Health Education at the University of Utah; Dr. Christensen is an assistant professor of health education and Ms. DiVincenzo is a doctoral candidate.

from interested agencies throughout their State. Therefore, from the State level viewpoint, securing funding for local intervention projects would be one measure of success in the promotion of health.

The requirements of the local intervention grants were concise and grounded in sound planning principles. Grantees were required to submit proposals that (a) documented State or Territorial health needs and priorities, (b) revealed detailed plans for the development of a health promotion-disease prevention network, and (c) included evidence of either the existence or development of a statewide surveillance mechanism to provide and maintain a data base for monitoring the prevalence of selected risk factors. Each intervention project had to be a part of an organized approach within its community. Concurrently, State level programs were required to articulate with relevant university faculties so that technical assistance for program development and evaluation could be rendered as needed for local level intervention projects.

The intent of the State level dimension of the HE-RR Grants Program may be summed up as follows: A modest amount of money is available and will be awarded to States and Territories provided they are willing to take an organized, planned approach to the prevention effort with a commitment to avoid unnecessary duplication, maximize the use of existing local resources, target on specific problems, and document results.

The HE-RR program was planned as a 5-year federally funded endeavor. After 3 years, however, a shift in Federal funding policies removed the program from its categorical status and placed it into a State block grant mechanism. This mechanism was a reflection of the philosophy of President Reagan's Administration that States should assume greater responsibility for how Federal dollars are being spent. Groups of categorical grant programs were pulled together to form a single block. The HE-RR program was placed in the Federal prevention block, which consolidated eight existing categorical programs—emergency medical services, health incentive grants, hypertension control, rodent control, community- and school-based fluoridation, health education-risk reduction, home health services, and rape prevention and services (3). The money assigned to the 1982-83 blocks was generally equal to the sum of the 1981-82 appropriations for the programs in the block less 25 percent. The funding limitation meant that the several programs in the block must compete for levels of funding; some prospered, some were cut, and some were discontinued. In any case, the advent of block grants created financial

instability and left unresolved the question of program efficacy.

Evaluators faced with the task of assessing the worth of programs like the HE-RR effort, especially given the funding dilemma just mentioned, often find themselves between a rock and a soft place—the "rock" being the scientific and political pressure to provide solid quantitative evidence that the desired effect has been caused by the program and the "soft place" manifested by the complex phenomenological nature of health promotion and disease prevention. Consider some of those criteria that stand as hallmarks for good public health education evaluation: a plan for individual needs, use of multiple educational methods with a group or a single subject, and rejection of paternalistic manipulation in favor of voluntary participation. Paradoxically, these are the variables that researchers abhor because their very existence and interaction are likely to influence the study results. Like other observers (4-6), we believe that pure research paradigms are sometimes insufficient and often inappropriate for making judgments about the merits of a program like the one we are examining, especially its unique State level component.

Method

In seeking an alternative approach to evaluation, we re-examined the purpose of the HE-RR program. It seemed to us that the intent of the program was at least in part congruent with the definition of health promotion we have discussed elsewhere (7).

The process of advocating health in order to enhance the probability that personal (individual, family and community), private (professional and business), and public (federal, state and local government) support of positive health practices will become a societal norm.

We interpreted the intent to establish an organized approach to health promotion in the States and Territories as an effort to advocate healthful behavior by making educational resources and services readily available and accessible to more citizens. If that interpretation has validity, then one measure of success for the HE-RR endeavor might be reflected in the evidence that the program inspired or otherwise influenced the emergence of new health promotion efforts and outputs expressed in terms of the costs of those efforts and outputs. For the purpose of this evaluation, we have termed this multiplier effect the "new activity rate" (NAR), and we wanted to determine if such an effect indeed existed and could be measured. It should be emphasized here that we are not implying that the NAR is a reflection of health status or even of risk factor prevalence; the intent is to measure new health

promotion activity linked to the HE-RR program, not the outcomes of those activities.

The Conference of State and Territorial Directors of Health Education (CSTDHE) volunteered to send an open-ended questionnaire to the directors of health education in each of the 50 States and 4 Territorial health departments. The questionnaire, accompanied by a cover letter from the CSTDHE president, asked respondents to:

1. Identify and document new health promotion programs or activities which have come about as a direct result of your State-level program.
2. Provide the same information for the local intervention projects funded in your State or Territory.
3. Estimate the dollar costs to maintain these additional programs or projects for 1 year. Those surveyed were given instructions and guidelines for making cost estimates. Professional staff and program costs were based on existing budgets. Rates for volunteers' time were estimated at \$7.50 per hour based on an annual salary of \$15,250 for an entry level health educator.

To confirm the accuracy of the data collected, followup telephone interviews were conducted with a random sample of 30 percent of respondents. The interviews provided insight into the methodological problems in reporting. First, some believed that, had they been alerted to keep records on potential spinoffs at the outset, their responses would have been more accurate. As it was, all agreed that they probably underreported the number of spinoff programs; they included only those endeavors with which they had firsthand experience and knowledge. A second problem, related to the first, was that a few respondents had considerable difficulty in estimating program costs. The difficulty was attributed to the fact that not all respondents had a recordkeeping system. As a result, estimates of program costs may have varied according to the respondents' familiarity with a given program; this circumstance suggests that the figures reported were most likely underestimates.

Fifty-six percent of the States (28) and 1 of 4 Territories responded to the survey questionnaire. The inhabitants in these States represent slightly less than 50 percent of the total estimated U.S. population.

Findings

The table presents the CDC allocations to the States and Territories for both State level and local intervention projects; the table also provides the spinoff figures expressed in dollar estimates as generated by the survey. The sums in column A, the total funds allocated to individual respondent State level programs

for 1979, 1980, and 1981, serve as the denominator for calculating NARs. We used the 3-year sum for Federal allocations as the denominator for calculating NARs because we are trying to maintain conservative rate estimates. That is, time and effort spent in program startup activities tend to delay the opportunity to identify the outcomes that might result from a program effort of this kind.

Column B denotes the dollar estimate of State level program spinoff projects reported by each respondent and Column C, the total Federal allocation to individual respondents for their intervention projects for 1980 and 1981. The intervention grants were not prorated to States but were awarded in accordance with the project's technical merit; therefore, it was appropriate that individual States and Territories (in part due to their role as initiator) consider the intervention awards as part of their State level spinoffs.

Column D lists the dollar estimate for spinoffs from local intervention projects, and column E is simply the sum of columns B, C, and D for each survey respondent. It is important to note that spinoff projects were those new health promotion efforts judged by the respondents to have been influenced by the HE-RR program but funded by alternative sources. Survey results revealed a variety of program innovations and diverse funding sources including large and small businesses, insurance companies, schools, hospitals, volunteer agencies, State agencies, private foundations, and mass communications media.

For example, in Georgia, the State level HE-RR program stimulated the development and dissemination of a PTA school health curriculum in 11 school systems within the State over a 2-year period at a cost of \$106,000. North Dakota's State level program triggered the showing of a "Here's To Your Health" television series on Prairie Public Broadcasting; the operational cost of the series was \$38,000. In Utah, a supermarket chain invested more than \$50,000 in personnel, advertising, and capital outlay as the primary sponsor of a 3-day health fair in Salt Lake City. The fair provided educational programs, screening, and counseling and referral services to more than 50,000 Utahans. Also in Utah, the State level program was given \$20,000 by another State agency, the Highway Safety Department, to support a project in which infant safety restrainers were loaned to families participating in maternal and child health programs. The project was implemented in five local health departments.

The Maine HE-RR State level program developed an effective model for safe wood heating education, and the University of Maine Cooperative Extension Service disseminated the model statewide at a cost of

PREVENTION

Federal allocations to State and local programs for health education-risk reduction programs and the spinoff effects in 28 States and 1 Territory

State	State level programs		Local intervention projects		Total spinoffs E (B+C+D)	Total estimates based on survey responses	
	Federal funds 1979-81	Spinoffs	Federal funds 1980-81	Spinoffs		Federal new activity rate F-NAR B÷A	State new activity rate S-NAR E÷A
	A	B	C	D			
Alabama	\$ 187,316	\$ 71,084	\$ 382,691	0	\$ 453,775	.38	2.42
Alaska	245,900	16,800	392,305	\$ 63,150	472,255	.07	1.92
Arizona	420,289	19,200	1,369,666	0	1,388,866	.05	3.30
Arkansas	201,105	11,000	0	0	11,000	.05	.05
Colorado	244,670	91,000	278,782	6,000	375,782	.37	1.54
Georgia	230,928	169,500	157,750	3,500	330,750	.73	1.43
Hawaii	191,656	45,490	534,356	21,487	601,333	.24	3.14
Illinois	163,858	27,200	176,941	67,050	271,191	.17	1.66
Indiana	211,892	27,035	240,992	2,000	270,027	.13	1.27
Kansas	281,554	135,230	620,897	0	756,127	.48	2.69
Kentucky	249,773	5,487	653,189	0	658,676	.02	2.64
Louisiana	147,968	64,800	0	0	64,800	.44	.44
Maine	241,078	128,100	69,181	0	197,281	.53	.82
Massachusetts	304,316	155,300	677,900	0	833,200	.51	2.74
Minnesota	297,853	442,550	350,103	0	792,653	1.49	2.66
Montana	201,714	81,250	0	0	81,250	.40	.40
Nebraska	200,259	7,800	65,303	42,804	115,907	.04	.58
North Carolina	290,618	55,500	593,473	0	648,973	.19	2.23
North Dakota	203,490	123,500	0	0	123,500	.61	.61
Ohio	677,402	55,000	2,052,569	255,000	2,362,569	.08	3.49
Oklahoma	173,225	102,000	68,511	0	170,511	.59	.98
Oregon	98,754	34,000	0	0	34,000	.34	.34
Pennsylvania	246,177	49,000	649,198	0	698,198	.20	2.84
Rhode Island	287,517	169,660	446,725	4,900	621,285	.59	2.16
South Carolina	209,499	29,600	206,659	7,335	243,594	.14	1.16
Utah	326,221	147,800	457,808	43,500	649,108	.45	1.99
Vermont	230,837	2,100	0	0	2,100	.01	.01
Virginia	256,182	12,663	678,571	5,600	696,834	.05	2.72
Virgin Islands	123,339	4,300	0	0	4,300	.03	.03
Total	\$7,145,390	\$2,283,949	\$11,123,570	\$522,326	\$13,929,845	.31	1.95

\$25,000. In Colorado, the Red Cross took the lead responsibility to produce a statewide directory of health promotion services; the total cost for producing 100,000 copies was \$28,000.

Applying the "organized approach," Minnesota's State level program coordinated an effort which generated \$31,000 to support the implementation of the school health curriculum project in Duluth's school system. Funds were contributed as follows: \$12,000 from the Minnesota State Interagency Volunteer Council, \$7,000 from the Minnesota Office of the American Heart Association, \$7,000 in Federal Title 4C funds from the State Office of Education, and \$5,000 from the Nutrition Education Training Program of the State Office of Education.

New activity rates were calculated at both the Federal and individual State level. To calculate a NAR stimulated by Federal support (F-NAR), which constituted the spinoffs generated by the State level allo-

cation, excluding awards for local level interventions, the following formula was used: column B divided by column A.

To calculate a State-level new activity rate (S-NAR), we added the 1980 and 1981 awards for local-level interventions to the numerator and applied this formula: column E divided by column A.

Conclusions

In this study it is assumed that an important, but often unmeasured, outcome of health promotion activities is the extent to which they are catalysts in generating new health promotion programs. Findings from the present survey strongly suggest that the HE-RR Grants Program did result in a multiplier effect, as evidenced by investments from the private, volunteer, and public sectors in the form of health promotion programs in the respondent States. Further, it was demonstrated that those effects could be quantified and measured;

therefore, we offer a means for calculating what we have termed a new activity rate, the NAR.

The calculated F-NAR for each respondent ranged from .01 to 1.49. Summing all State and intervention spinoff dollars and dividing that sum by the total CDC allocation to State level programs for all respondents, the average F-NAR was .31. Based on the responses obtained, the F-NAR of 31 percent constitutes a crude national estimate of new health promotion activities generated above and beyond the initial Federal investment. Of the 28 respondents, 9 States (33 percent) reported spinoff project dollars in excess of 50 percent of their total CDC State level allocations. All respondents reported at least some spinoff dollars.

State level new activity rates (S-NAR) were computed differently. In addition to the State level and intervention spinoff dollars, the monies obtained from the CDC intervention grants were added to the numerator. Using this method, S-NARs for respondents ranged from .01 to 3.48; the average S-NAR for all respondents was 1.95, nearly a 200 percent increase. Seventeen respondents (62 percent) matched or exceeded in spinoff dollars their total 1979-81 Federal-State-level investment. Eleven States (40 percent) showed gains that more than doubled their CDC State level investment.

Discussion

While awaiting the outcomes of programs as ascertained from long-term evaluations, we undertook this study to determine whether a modest amount of seed money invested in health promotion activities would have a multiplier effect resulting in new health promotion events or programs. In spite of methodological limitations, several aspects of this study are extremely encouraging and lead us to believe that the F-NAR of 31 percent is a conservative estimate of what the HE-RR Grants Program has probably generated. Applying the F-NAR (31 percent) to the total Federal-State-level allocation, it is appropriate to conclude that the Federal investment of \$12 million realized a 31 percent increase in health promotion "profits." In other words, the CDC HE-RR program generated nearly \$4 million worth of new health promotion activity; most of it was funded by the private or volunteer sectors of society.

Historical trends aside, we speculate that several factors, including the requirements of the HE-RR Grants Program, may have contributed to the NAR reported in the survey.

First, as mentioned earlier, applicants were obligated to take an organized approach to risk reduction programming. Objectives had to be delineated on the basis

of documented need; intervention and evaluation plans had to be presented in accordance with the objectives. The organized approach was emphasized not only on the basis of what was obvious in terms of theory, but also because CDC officials found only limited evidence that such specificity was used in the field. The quarterly HE-RR progress reports to CDC offer substantial evidence that the organized approach had indeed been planned and put into operation in every State sampled.

A second element of the grants required that States either strengthen or establish contacts with agencies or groups in order to form a risk reduction network. The goal was to enhance communication among multiple groups in an effort to maximize resources and reduce unnecessary duplication. Even though the quarterly reports indicate a general increase in these networks at the State level, there appeared to be considerable variance in both the sophistication and use of these networks.

A third component of the grant program required States to consult with relevant faculty at local universities (within the State or in geographic proximity) to obtain technical assistance, especially for program evaluation for smoking and alcohol projects. Again, the quarterly reports document such consultation, but the efficacy of the exchange cannot be determined immediately. The three grant requirements just described were augmented by training workshops and consultations jointly organized by CDC and the several States and Territories. This training endeavor may have been a salient factor in activating spinoffs at the State and local levels.

Another contributing factor may have been the increase in State level health education personnel from 200 in 1979 to 600 in 1981, most of it attributable to HE-RR resources. This increase was documented in an unpublished survey conducted by CDC's Center for Health Promotion and Education. Further, the personal competencies of State and local level personnel and the degree of administrative support at the local level undoubtedly were important in these endeavors. Additional analysis is needed to determine which factors, either independently or in combination, account for most of the magnitude of the gain detected.

Finally, we would be remiss not to discuss briefly the potential usefulness of a concept like the new activity rate in the political arena. Health promotion advocates, like most helping professionals, are committed to their work and believe in the personal and social benefits attributed to it. Others are less sure of those benefits. Most often those others are the decision makers whose task it is to distribute resources for health

and welfare, and it takes more than belief and zeal to influence their views and actions.

By now decision makers have gotten the message that prevention efforts, especially those involving lifestyles, require time to yield detectable improvements in health status. The application of the NAR concept may prove useful as an indicator of substantial and real "profits," expressed in economic terms, to the citizens of a State or local community. The gain reflected by the NAR calculation may be interpreted as concrete evidence of the private sector's willingness to invest in health promotion activities. In this case it appears that such investment followed a well-planned model initiated by the government in the interest of public health. By bringing this economic perspective to budget meetings and finance subcommittee reviews, risk reduction workers and other health promotion advocates add a dimension to their case with which fiscally minded decision makers can identify.

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SYNOPSIS

KREUTER, MARSHALL W. (Centers for Disease Control), CHRISTENSEN, GREGORY M., and DIVINCENZO, ANGELA: *The multiplier effect of the health education-risk reduction program in 28 States and 1 Territory. Public Health Reports, Vol. 97, November-December 1982, pp. 510-515.*

The multiplier effect of the Health Education-Risk Reduction (HE-RR) Grants Program funded by the Public

Health Service is examined to identify outcomes for the period 1979-81. Responses to a questionnaire from the directors of health education of 28 States and 1 Territory supplied the information concerning new health promotion activities generated by the program. The directors were asked to identify and give cost estimates of new activities that resulted from State-level and local intervention projects.

A method for calculating the extent to which the HE-RR program influenced new health promotion activities that were funded by alternate sources was devised. The calculation, termed the new activity rate, was applied to the survey data. Rates calculated for the HE-RR program revealed that it generated nearly \$4 million in new health promotion activities, most of them funded by the private and voluntary segments of society.

Assessment of Immunoglobulin Use for Hepatitis A Control in New Mexico

JONATHAN M. MANN, MD, MPH
DONALD P. FRANCIS, MD, DSc
RICHARD E. HOFFMAN, MD
JEAN MONTES, BA



HEPATITIS A (HA) is a major infectious disease problem in the United States; more than 30,000 cases were reported in 1979 (1). Moreover, several studies in this country suggest that HA is seriously underreported and that only 10 to 30 percent of the clinically diagnosed cases are reported to public health agencies (2,3). Once the disease develops, there is no treatment. However, there are two effective preventive measures: (a) improvement in sanitation and personal hygiene to prevent fecal-oral transmission and (b) immunoglobulin administration to prevent disease in those at high risk of becoming infected. Household contacts of patients with HA are at high risk of contracting the disease, and immune globulin (IG—former-

ly immune serum globulin or gamma globulin) has been shown to reduce clinical disease in these contacts from about 8-20 percent to about 2-3 percent (4-6). As a result, the Public Health Service Advisory Committee on Immunization Practices (ACIP) recommends that IG be given to all household contacts of patients and others acutely ill with hepatitis A (7).

Immunoglobulin must be given as soon as possible after exposure, since it seems to be most effective when given during the first half of the 1-month incubation period of HA (5). The ACIP therefore recommends that IG be given no later than 2 weeks after exposure (7).

Patients probably excrete the most hepatitis A virus in the week before the onset of clinical illness (8,9), and thus the greatest chance for transmission of infection to certain close contacts is during that period. Therefore, at the time of diagnosis, some close contacts may already be 1 week or more into the incubation period. If administration of IG to the HA patient's contacts is delayed, little preventive effect is realized.

Despite the importance of a rapid response to HA cases, little is known about practices in the use of IG for

HA control in the community. An increase in HA incidence in New Mexico during late 1978 and early 1979 prompted the development of an aggressive strategy for evaluating HA morbidity trends and health department efforts in HA control. As part of this program, the use of IG for the household contacts of all persons with HA cases reported from January to June 1979 was examined. We present an analysis of both the reporting characteristics and the practices in IG administration in New Mexico during that period.

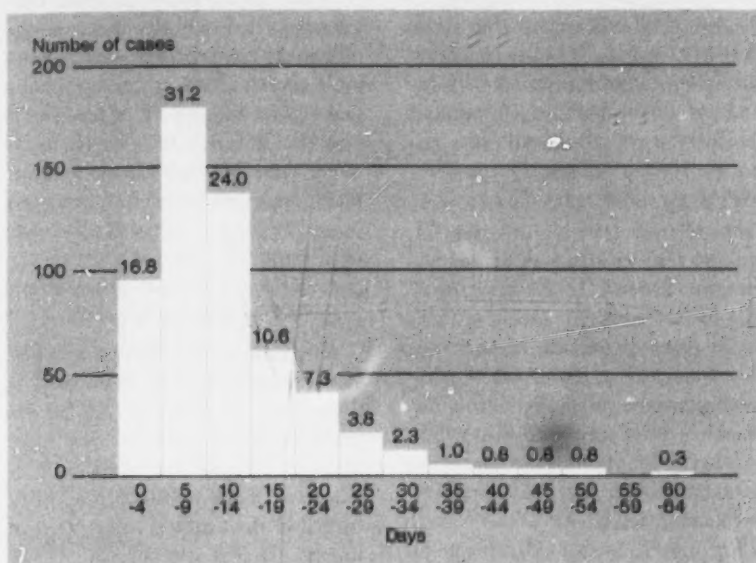
Materials and Methods

The Health Services Division of the New Mexico Health and Environment Department is responsible for communicable disease reporting and control in the State. The two major sources of reports of disease are private physicians and local health offices. In New Mexico, the 42 local health departments (with the single exception of Los Alamos County) are field offices of the division. Physicians and local health offices generally report through a toll-free telephone system, although written reports are also received. Reportable diseases are tabulated, and data are forwarded weekly to the national disease surveillance

Dr. Mann is assistant director and Ms. Montes is a planner, Health Promotion and Disease Prevention Office, Health Services Division, New Mexico Health and Environment Department, P.O. Box 968, Santa Fe, N. Mex. 87503. Dr. Francis is chief of the Epidemiology Section of the Hepatitis and Viral Enteritis Division, Centers for Disease Control (CDC), Phoenix, Ariz. Dr. Hoffman at the time of the study was an Epidemic Intelligence Service Officer assigned to the CDC Field Services Division, Epidemiology Program Office, Atlanta, Ga. Tearsheet requests to Dr. Mann.

PREVENTION

Figure 1. Period from onset of illness until physician's report of hepatitis A case to local health office, 576 cases, New Mexico, January-June 1979



NOTE: Figures at top of bars are percentages of all cases.

system of the Centers for Disease Control (CDC).

Before January 1979, HA reports included the name, address, age, and sex of the patient, date of onset, physician's name, and date that the case was reported by the local health office to the Health Services Division. In January 1979, a nurse

epidemiologist, in addition to gathering this information, routinely obtained the date of the physician's report to the local health office, the number of household contacts of the patient (if any), the number of household contacts who were given IG, the date(s) of IG administration, the source of IG, and whether

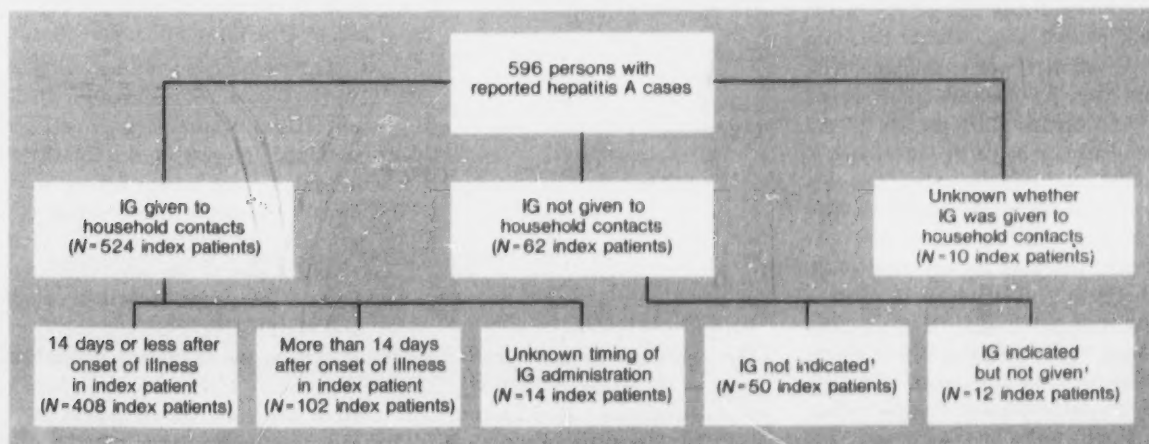
the patient was known to be associated with a day-care center or a commercial food establishment. The final two pieces of information were useful in identifying possible HA clusters in the community.

A case of hepatitis A was defined as any case of physician-diagnosed hepatitis A or infectious hepatitis. No specific symptom criteria were used, and HBsAg testing was not required. Persons eligible for IG were identified from lists of household contacts obtained from the physician, the patient, or other household member. All persons living in the same household as the HA patient at the time of onset of the patient's case were considered eligible household contacts.

Results

Incidence of disease. During the first 6 months of 1979, 596 cases of HA were reported from 25 of New Mexico's 32 counties. The largest number of cases (371 or 62 percent) were reported from the most populous county, Bernalillo. The annualized incidence rate for Bernalillo County (183.4 cases of HA per 100,000 population) was more than 3 times greater than the

Figure 2. Administration of immune globulin (IG) to household contacts of 596 persons with reported hepatitis A cases, New Mexico, January-June 1979



*For reasons, see text.

incidence rate for the rest of the State (57.3 cases per 100,000 population). The overall annualized incidence rate for New Mexico during the study period was 95.9 cases per 100,000 population. Age-specific rates had a bimodal configuration, peaking at 5-9 and 25-34 years of age. One hundred and seventy cases were day-care related (28.5 percent of the total), and 30 cases (5 percent) occurred in commercial food-handlers.

Reporting of HA cases. Data on the period from onset of illness until the physician's report to the local health office were available for 576 cases. The mean period of latency was 12.3 days, with a median of 10 and a range of 0-60 (fig. 1). Overall, 415 cases (72 percent) were reported within 14 days of the onset of illness, and 161 cases were reported more than 14 days after onset. Cases were significantly more likely to be reported late (more than 14 days after onset) from Bernalillo County (32 percent) than from the rest of the State (19 percent) $\chi^2 = 12.8, P < 0.001$.

Administration of IG. The HA patients had a mean of 3.8 and a median of 3 household contacts. An overview of IG use is provided in figure 2. IG was administered to household contacts of 524 of the 586 patients for whom data on their contacts were available (89 percent). IG was not administered to the household contacts of 62 patients (11 percent). A review of the 62 cases revealed several reasons why IG was not provided: lack of any household contacts (28 patients); IG had already been given as a result of exposure to another HA patient during the previous month (17 patients); household contacts were already ill with HA (4 patients); and a prior documented history of HA (1 patient). Thus, for the contacts of 50 of the

62 patients, IG was not indicated. The family of one patient refused IG, and the family of another could not be located. The reason that IG was not administered to contacts of the remaining 10 patients (2 percent of the total 586 patients) could not be ascertained.

Of the total 2,224 household contacts, 66 were not eligible for IG, and 37 did not receive it for the reasons outlined. In addition, in 42 of the 524 cases in which IG was given to household contacts, it was not administered to all of the patient's contacts, resulting in an additional 116 unprotected household contacts. Of the 2,158 household contacts eligible for IG, 2,005 (93 percent) received it.

IG was provided exclusively by private physicians to household contacts of 276 patients, by the local health office only to household contacts of 229 patients, and by both to the contacts of the remaining patients.

It was possible to determine the length of the period between the onset of illness in the index patient and the administration of IG to household contacts in 510 of the 524 cases in which IG was administered to household contacts. The following table shows the distribution of these 510 cases by the number of days in this period.

Number of days in period	Number of HA cases	Percent of total
0-4	120	23.5
5-9	176	34.6
10-14	112	21.9
15-19	46	9.0
20-24	34	6.7
25-29	12	2.3
30-34	4	.8
35-39	3	.6
40-44	1	.2
45-49	2	.4

The mean number of days from onset to IG administration was 9.8, with a median of 8 and a range of 0-45. In 80 percent of the cases, IG was administered to household con-

tacts within 14 days of the onset of illness in the index patient. This period varied slightly, but not significantly, according to whether the local health office or private physicians gave the IG. The household contacts did not receive IG until more than 14 days after the onset of illness in 23 percent of the cases in which the local health office administered it, compared with 19 percent of the cases in which it was provided by private physicians.

A significant association was observed between early reporting of the disease (report received by the health office 14 days or less after onset of illness) and early administration of IG to household contacts (14 days or less after onset of illness). In 359 (96 percent) of the 376 cases that were reported early, IG was administered early to the household contacts. In contrast, in the late-reported cases, the household contacts of only 49 (37 percent) of the patients benefited from early administration of IG ($\chi^2 = 214, P < 0.001$).

Household contacts were more likely to receive IG from private physicians if they lived in Bernalillo County than in the rest of the State. In Bernalillo County, 72 percent of the IG was administered by private physicians, compared with 39 percent in the rest of the State ($\chi^2 = 60, P < 0.001$).

The period from the reporting of an HA case to the health office until IG was administered was determined for 188 of the 229 cases in which local health offices were the sole sources of IG for household contacts. IG was given to contacts within 1 day of the physician's report in 74 percent of these cases and within 4 days in 90 percent.

Finally, we examined the subset of cases in which the local health office had received the report early (14 days or less after onset of illness), and yet in which IG was

not given to household contacts until more than 14 days after the onset of illness. Twelve such cases occurred, with delays in IG administration to household contacts ranging from 1 to 14 days. The proportion of cases with a delay of more than 4 days from the time of the report until administration of IG was significantly greater for these 12 cases than for all other cases handled by the local health offices ($\chi^2 = 24$, $P < 0.001$). Thus, in these 12 cases, the health offices' delay in responding to physician reporting was responsible for the failure to administer IG to household contacts within 14 days of the onset of disease.

Discussion

Evaluation of hepatitis A reporting and the practices in IG administration in New Mexico from January to June 1979 revealed several noteworthy features of HA surveillance and control in New Mexico. Nearly three-fourths of the HA cases were reported to local health offices with-

in 14 days of the onset of illness, a period that incorporates both the latency from onset to diagnosis and from diagnosis to report. When reporting is done within this period, community control efforts can focus on administering IG to appropriate contacts. Of the household contacts in our study eligible to receive IG, 93 percent received it—80 percent within 14 days of the onset of illness in the patient. The cases that were reported late (more than 14 days after onset of illness) were significantly associated with delayed IG administration. This association may reflect the patient's delay in seeking medical attention or the physician's delay in diagnosis, reporting, or administration of IG to household contacts. The local health offices were quick to respond when physicians reported cases and in most instances provided IG promptly to household contacts.

The responsibility for providing IG was shared nearly equally by physicians and local health offices. However, a significantly greater

proportion of the contacts of patients in Bernalillo County (the single major metropolitan area in New Mexico) than in the rest of the State received their IG from private physicians. The reason for this greater use of private physicians may be their relative abundance in Bernalillo County—282 per 100,000 population, compared with 102 per 100,000 population in the rest of New Mexico in 1978 (10)—or differences in the relationship between physicians and local health offices in urban and rural areas.

Our data could suffer from bias associated with reporting. It may be that the contacts of HA patients who are reported are more likely to receive IG, or more likely to receive it promptly, than are the contacts of patients who are not reported. This probable bias cannot be evaluated within the scope of this study; nor can the completeness of HA reporting in New Mexico during the study period be assessed.

The data on IG administration to household contacts allowed us to evaluate the costs and benefits of HA surveillance and control by the Health Services Division of the New Mexico Health and Environment Department (see box). The minimum estimate of benefits can be determined by calculating the number of secondary cases in household contacts that were prevented by administration of IG by the local health offices. Based on the assumptions stated in the box, 123 cases of HA were averted by the local health offices' administration of IG to household contacts. In 1979 dollars, this saving translates to approximately \$170,000 in direct and indirect costs, with a benefit-to-cost ratio of approximately 5 to 1. The benefits and costs for HA control when IG is provided by private physicians are unknown.

Since both the practices in re-

Costs and benefits of hepatitis A surveillance and control, New Mexico, January-June 1979

COSTS

Central office:

Personnel (physician-epidemiologist, nurse-epidemiologist, secretary) . . .	\$19,625
Supplies, telephone, mailings	900

Local health office:

Personnel (public health nurses, clerks)	13,000
Supplies (includes IG—immune globulin), telephone	500

Total	\$34,025
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BENEFITS

HA cases averted among household contacts = 123¹

Total savings = 123 cases $\times$ \$1,353 per case² \$166,419

Benefit-to-cost ratio = \$166,419 to \$34,025, or 4.89 to 1³

¹ 706 household contacts given IG 14 days or less after onset of illness in index patient. Cases averted is difference between expected cases without IG ($0.20 \times 706 = 141$) and expected cases with IG ($0.025 \times 706 = 18$).

² Estimated direct and indirect costs of an HA case in 1979, based on data of Tolsma and Bryan (11) and updated to 1979 with 10 percent annual inflation factor.

³ Additional assumptions: (a) no beneficial effect to the 173 contacts given IG more than 14 days after onset in index patient, (b) no additional benefits from health department's work, such as more rapid patient diagnosis because of attention given HA, and (c) 87 percent protective efficacy of IG against symptomatic HA.

porting and in IG use were found to be generally good among physicians who reported hepatitis A, the health department could anticipate little additional improvement from directing further awareness measures at this group. However, informational efforts on the value of reporting and on appropriate strategies for IG use among HA contacts could be directed at the physicians who do not report HA cases. The data obtained in this study could be disseminated as part of such an educational program.

The health department's emphasis during the study period on HA reporting and control probably made local health office personnel and private physicians more aware of this disease problem. Therefore, the practices in HA reporting and IG administration during this period may have improved in response to the increased attention to HA in New Mexico. For this reason, the data presented here may represent the optimal functioning of the HA reporting and control system in the State.

Present public health efforts in HA control are necessarily com-

plex, given currently available disease control technology. For this reason, assessment of even such well-accepted and traditional strategies as IG prophylaxis for household contacts of patients with HA can provide useful insight into the actual operation of disease control programs in this country. Our study demonstrates the value to the community of public health department participation in HA control. Further improvements in HA control might result from outreach to health care providers not reporting HA or from advances in HA control methodology.

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SYNOPSIS

MANN, JONATHAN M. (New Mexico Health and Environment Department), FRANCIS, DONALD P., HOFFMAN, RICHARD E., and MONTES, JEAN: *Assessment of immunoglobulin use for hepatitis A control in New Mexico. Public Health Reports*, Vol. 97, November-December 1982, pp. 516-520.

Community control of hepatitis A (HA) requires improvement of sanitation and timely use of immune globulin (IG) for selected contacts of ill persons. A marked increase in reported HA cases in New Mexico in late 1978 and early 1979 prompted aggressive evaluation of morbidity trends and of control efforts. This

evaluation provided an opportunity to study the practices in disease reporting and IG administration in the State.

In the 6-month study period January-June 1979, 596 cases of HA were reported in New Mexico (an annualized incidence rate of 95.9 cases per 100,000 population). Nearly three-fourths of the cases were reported within 14 days of onset of illness. IG was administered to the household contacts of 89 percent of the index patients; it was not indicated for the household contacts of 9 percent. Reasons for the failure to administer IG to the household contacts of the other 2 percent of the index patients were not ascertained. Overall, 93 percent of the eligible house-

hold contacts received IG, and 80 percent of these contacts received it within 14 days of the onset of illness in the index patient. Differences in the relationship of physicians and health offices in the only metropolitan area in the State and in the rest of the State in respect to case reporting and IG administration were observed.

The benefits from health department surveillance and control exceeded the costs by approximately fivefold. The reporting practices and the IG use of the physicians who reported HA cases were good; to improve further HA surveillance and control in the State, the focus needs to be on physicians who fail to report HA cases.

Patterns of Care for Hypertension Among Hospitalized Patients

BELAVADI S. SHANKAR, ScD
R. PATTERSON RUSSELL, MD
JOHN W. SOUTHARD, MD, MPH
EARL W. SCHURMAN



ELEVATED BLOOD PRESSURE WAS SHOWN by the Framingham study to be the single most important risk factor in cardiovascular morbidity and mortality (1). More recently the Hypertension Detection and Follow-up Program has demonstrated that cardiovascular mortality can be reduced by systematic treatment of elevated diastolic blood pressure (DBP) ranging from 90 to 104 mm Hg (2). With these facts firmly established, a high priority at the national level has been assigned to making hypertension control an integral part of health care delivery and to making efficient use of the existing resources of high blood pressure

programs. Maryland is one of seven States that has received funding under a National Heart, Lung, and Blood Institute contract to establish and evaluate a statewide coordination program for high blood pressure control.

To obtain a data base for planning and evaluating such a program, a baseline records survey was done on patients who had been discharged from Maryland hospitals during 1978. Estimates from the records survey have been used in setting up a statewide high blood pressure control program. To measure the changes in selected parameters and to assess the effect that the statewide coordination efforts have had on hypertensive care in Maryland, a repeat records review is planned.

A summary of this study was sent to the directors of medical and nursing services of all hospitals in the State to alert them to any problems in hypertension care and control. These results were also discussed with members of the Professional Practices Committee of the Maryland Hospital Association and were used in setting up professional education modules, as part of a statewide coordination plan.

Methods

Abstracts of hospital discharge records comprised the main data base for our study. Data from the household survey were used to substantiate the hospital discharge data.

Dr. Shankar is a research statistician and codirector of the Statewide High Blood Pressure Coordination Project, Maryland State Department of Health and Mental Hygiene (DHMH). Dr. Russell is an associate professor of medicine, Johns Hopkins University School of Medicine, and chairs the Maryland High Blood Pressure Commission and the Hospital Protocols and Procedures Committee of the Statewide Coordinating Council. Dr. Southard is director of the Statewide High Blood Pressure Coordination Project and chief of the Division of Adult Health Program Development, DHMH. Mr. Schurman is program coordinator of the Maryland High Blood Pressure Coordinating Council.

This paper is based on a presentation at the National Conferences on High Blood Pressure Control held in Houston, Tex., March 25, 1980, and in New York City, May 4, 1981. The project described was supported by the National Heart, Lung, and Blood Institute under contract No. N01-HV-7-2986 with DHMH. Tearsheet requests to Dr. Belavadi S. Shankar, Maryland State Department of Health and Mental Hygiene, Rm. 306B, 201 West Preston St., Baltimore, Md. 21201.

Abstracts of hospital discharge records. The target population of the abstracts survey was patients 18 years or older who had been discharged from any acute care hospital in Maryland in 1978. The State Professional Standards Review Council, the local Professional Standards Review Organizations (PSROs), the Maryland Hospital Association, and the Maryland Medical Records Association worked closely with the Hospital Protocols and Procedures Committee of the Maryland High Blood Pressure Coordinating Council on this project during the planning stage. These organizations also assisted in refining the abstract form and in obtaining the support of the staffs of the 50 acute care hospitals in the State. A 5 percent systematic random sample of discharges from each of the 40 acute care hospitals that agreed to participate in the survey was selected for study.

The medical records personnel of the 40 hospitals were requested to do the record abstracting in such a way that confidentiality would be preserved and accuracy assured. In most hospitals, the persons doing the abstracting had been working in the facility's Quality Assurance Program. They were paid a nominal fee for pulling the records and preparing the abstracts. The abstracters were asked to scan the entire medical record of selected patients. Each hospital took a number between 1 and 20 at random, and from then on every 20th record was abstracted on a standardized form. Information about medicine prescribed for hypertension and advice or instruction about followup care that had been given was abstracted only if the patient's chart showed a least one DBP $\geq$ 100 mm Hg

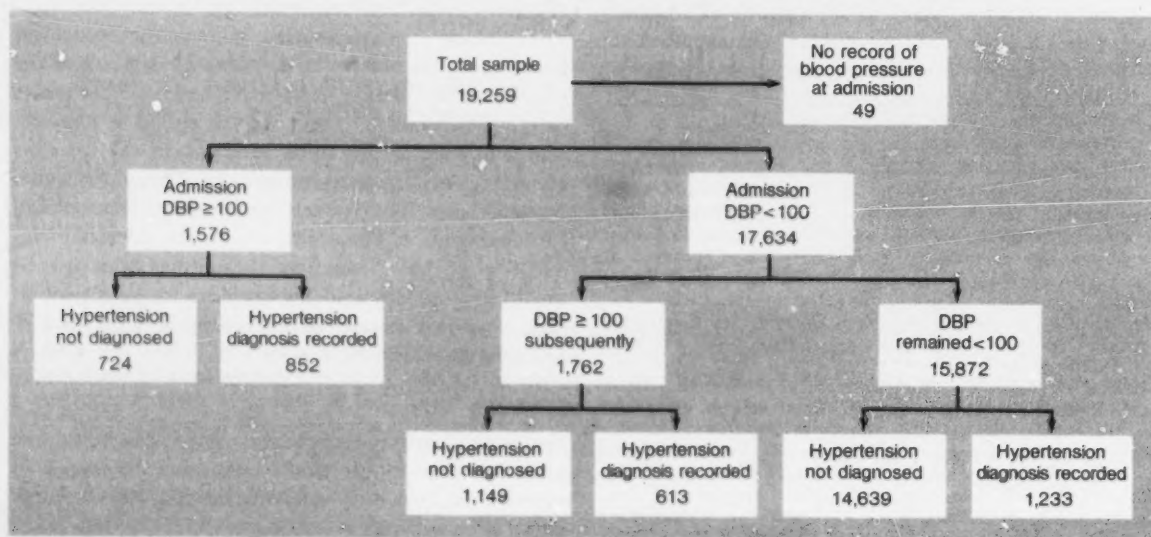
or a diagnosis of hypertension. The final sample consisted of 19,259 records, and abstracts of these were sent to the State health department for editing and computerization. The project was completed in 18 months. No checks on the reliability of the abstracts were possible because of the project's limitations.

No significant differences between the participating and nonparticipating hospitals were found with respect to size, location, or teaching status. Comparison of the hospital survey sample with the total adult population discharged from Maryland hospitals in 1978 failed to identify any significant differences in the distributions by age, race, sex, or length of stay.

Household survey. Between July 1978 and March 1979, a probability sample of 6,425 Maryland residents 18 years of age and over were interviewed in their homes, and their blood pressure was measured. Technical details of the design and conduct of this survey have been reported previously (3).

Among other matters, such as awareness and treatment for high blood pressure, the 6,425 adults were asked if they had been hospitalized in the 12 months before the interview. Approximately 12 percent (763) of the respondents said that they had been hospitalized in the specified period. This percentage, when projected to the State population of adults, matches the total percentage of adults discharged from all hospitals in Maryland in that period. (The household survey recall period coincided approximately with the period of this hospital discharge survey.)

Figure 1. Distribution of the sample of adult hospital patients by diastolic blood pressure (DBP) status



Results

Prevalence. As figure 1 shows, overall, 17.4 percent (3,338) of the 19,259 patients whose records were abstracted had elevated DBP (that is, a diastolic blood pressure ≥ 100 mm Hg had been recorded in their charts at least once). Of the 19,259 patients, 8.2 percent (1,576) had a high diastolic blood pressure recorded at admission; 9.2 percent (1,762) had such a reading recorded subsequently in their hospitalization; 6.4 percent (1,233) had diagnosed hypertension (that is a diagnosis of hypertension had been entered in their charts) without elevated DBP; 76 percent (14,639) had neither elevated DBP nor diagnosed hypertension. The prevalence of elevated DBP or diagnosed hypertension was higher among blacks than whites, as the following table shows.

Demographic category	Percentage of total sample within each category		
	DBP ≥ 100 but hypertension not diagnosed	DBP < 100 with diagnosed hypertension ¹	DBP ≥ 100 with diagnosed hypertension ¹
Race and sex:			
Black males	15.5	9.2	16.8
White males ...	13.3	5.9	7.2
Black females ...	8.6	8.1	13.1
White females ..	7.1	6.0	5.3
Age (years):			
18-34	5.6	1.1	1.9
35-49	10.6	4.1	7.1
50-64	12.7	9.8	12.1
65 and over	12.0	12.6	12.0
Total sample	9.7	6.4	7.6

¹ Hypertension diagnosis entered in patient's chart.

The prevalence of elevated blood pressure regardless of diagnosis and the prevalence of diagnosed hypertension regardless of blood pressure level showed significant variations by race, sex, and age. Almost one of four patients 50 years and over had elevated DBP; more than one-third of this age group had elevated blood pressure or diagnosed hypertension.

Diagnosis. Forty-four percent (1,565) of the 3,338 patients with elevated DBP had a diagnosis of hypertension entered in their charts. Significant variations in the percentage of patients with a hypertension diagnosis were observed among age, race, and sex groups (fig. 2). Hypertension was more frequently diagnosed among blacks of all ages than among whites. Among young adults (18 to 34 years old) with a DBP ≥ 100 mm Hg, only 1 of 4 patients overall and less than 16 percent of white males were diagnosed as hypertensive. In all age groups, hypertension was less frequently diagnosed in white males than in other race-sex groups ($P < 0.01$). Such age, race, and sex differences existed in almost all hospitals.

The percentage of patients with a diagnosis of elevated blood pressure entered in their charts was independent of the length of stay in the hospital. Twenty-five percent of the patients with an admission DBP ≥ 115 mm Hg had no diagnosis of hypertension entered in their charts.

Medication. Sixty-two percent (1,673) of the 2,698 patients with a recorded diagnosis of hypertension were on antihypertension medication (diuretics or any specific antihypertension drugs ordered in the hospital). Age, race, and sex differences among the diagnosed hypertensives were significant with respect to treatment (fig. 3). Among diagnosed hypertensives who also had elevated DBP (not shown), the proportions treated while in the hospital ranged from 48 percent of white males to 70.0 percent of black females; the corresponding percentage for white females was 58.8 percent and for black males, 71.5 percent ($F = 13.0$, $P < 0.001$). The percentages of diagnosed hypertensives among adult age groups treated while in the hospital was as follows: 18-34 years, 46.8 percent; 35-49 years, 54.5 percent; 40-64 years, 64.3 percent; and 65 years and over, 64.1 percent ($F = 9.7$, $P < 0.001$).

Less than a third of white females aged 18-34 who had a diagnosis of hypertension received medication while in the hospital (fig. 3). White males received medication less frequently than any other race-sex or age groups except the group 18 to 34 years old.

The actual percentage of hospital patients receiving medication for hypertension may have been less than our figures indicate, since a proportion of the patients received some of the medications included in this analysis as treatment for other ailments, such as diabetes and heart conditions.

The medications that were ordered did not show any significant correlation with the length of the hospital stay. Almost a third of the hypertensives who stayed for 5 days or more received no antihypertension medication.

In the baseline household survey, 12 percent (763) reported that they had been hospitalized in the 12 months before the interview. The following table shows the effect of hospitalization on awareness about hypertension and on treatment among 310 household survey respondents with an average DBP ≥ 95 mm Hg.

Hospitalization status	Not on medication		Aware and taking medication	Total
	Not aware	Aware		
Hospitalized in previous 12 months ..	11	9	19	39
Not hospitalized in previous 12 months ..	121	70	80	271
Total	132	79	99	310

Figure 2. Percentage distribution of diagnosed hypertension among patients with elevated diastolic blood pressure, by race-sex and age group

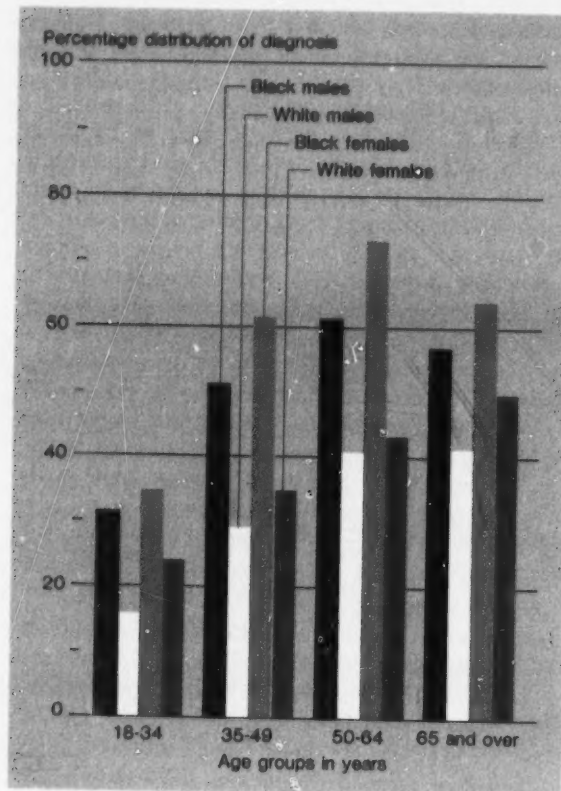
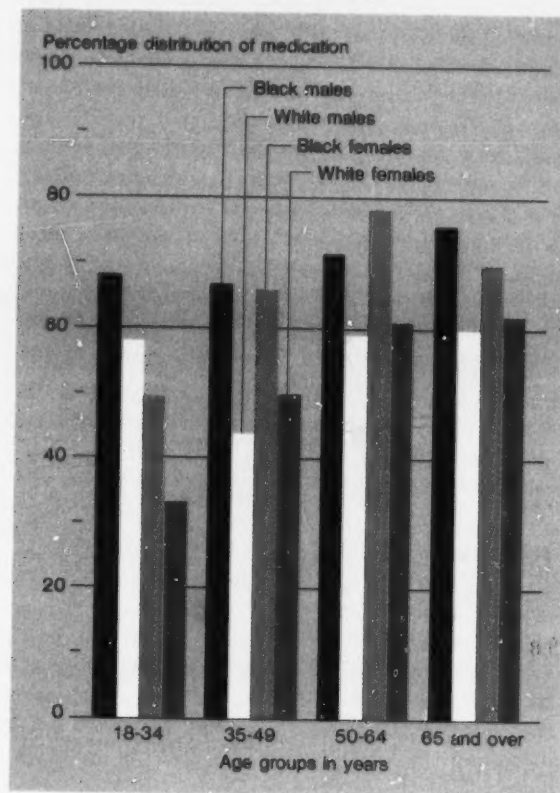


Figure 3. Percentage distribution of patients with medications ordered among those patients with diagnosed hypertension, by race-sex and age group



Although those respondents who had been hospitalized within the previous 12 months were slightly more likely to be on antihypertension medication ($X^2 = 6.20$, $P < 0.05$), no significant differences were noted between hospitalized and nonhospitalized persons with respect to awareness or with respect to treatment among those who were aware, as the following table shows.

Awareness and treatment status	Hospitalized	Not hospitalized	Chi square	P
Aware	28	150	3.77	> 0.05
Not aware ...	11	121		
Treated	19	80	2.016	> 0.15
Not treated ..	9	70		

Instruction or advice. Patients with diagnosed hypertension regardless of the elevation of blood pressure were more likely to have had instructions concerning diet or followup care recorded in their charts than those who had an elevated DBP regardless of diagnosis. This percentage was also significantly higher among blacks than whites in all age and sex groups. The following table shows the percentages of the various age-

race-sex categories receiving instruction by blood pressure status:

Age-race-sex category	Diagnosed hypertensives (all blood pressure levels)	Elevated DBP (both diagnosed and not diagnosed)
<i>18-34 years</i>		
Black males	84.4	39.1
White males	58.0	23.4
Black females	74.1	41.2
White females	49.2	36.7
<i>35-49 years</i>		
Black males	83.6	54.6
White males	61.4	31.3
Black females	85.3	66.2
White females	61.6	35.9
<i>50-64 years</i>		
Black males	84.6	69.1
White males	64.5	46.2
Black females	88.2	73.8
White females	68.3	50.0
<i>65 years and over</i>		
Black males	73.1	67.0
White males	64.6	50.6
Black females	82.7	67.2
White females	69.8	53.8

With patients who stayed in the hospital 2 days or less

excluded, no significant correlation was observed between length of stay and receiving instructions about the care of hypertension. About half of the patients with DBP ≥ 100 mm Hg at discharge did not have a record of having received instructions about the care of hypertension.

Discussion

One of the most consistent and significant results of the study related to racial differences. The percentages of patients with DBP ≥ 100 mm Hg who were diagnosed as hypertensive, were treated, and were given advice about hypertension was consistently lower among whites than among blacks, regardless of age, sex, or type of hospital. One explanation for the lower rate of hypertension diagnosis among whites might be that they have more elective surgery than blacks. On admission for elective surgery, a diagnosis of hypertension might not be recorded as often as for other admissions. Also, treatment for hypertension might be stopped temporarily, or advice about the condition might not be given because the patient was already under the care of his or her family physician.

In the survey of 19,259 hospitalized adult patients, 23.8 percent (4,577) were found to have either an elevation of their DBP ≥ 100 mm Hg or a diagnosis of hypertension documented in the hospital record. The household survey of 6,425 adults revealed that 19.4 percent (1,247) had a diastolic pressure ≥ 90 or were on antihypertension medication and that 14.9 percent (957) had a DBP ≥ 95 or were on antihypertension medication.

The finding of one elevated DBP ≥ 100 mm Hg either on admission or subsequently during a hospital stay is not synonymous with a diagnosis of hypertension. However, such an elevation is sufficiently abnormal under any circumstances to warrant followup and verification. In fact, Sacket and associates have shown that 80 percent of the persons with a single DBP reading ≥ 100 mm Hg will subsequently have other readings in this range (4). Yet, among 3,338 adult hospitalized patients surveyed in our study who had a DBP ≥ 100 mm Hg, only 44 percent (1,465) were diagnosed as hypertensive, and only 50 percent (1,669) had any record of having received instructions about high blood pressure. Possible reasons for this low rate of diagnosis and lack of instructions are as follows.

1. The patient's length of stay may have been too short to establish the diagnosis.
2. All of the patient's other blood pressure measurements in the hospital may have been within the normal range, that is, less than 90 mm Hg diastolic.

3. Subsequent measurements of the patient's blood pressure may have not been taken or a single elevated DBP ≥ 100 mm Hg may have been considered unimportant in a hospital setting.

4. Some physicians may have considered blood pressure levels between 100 mm Hg and 104 mm Hg too low to make a definitive diagnosis.

5. The patient's elevated blood pressure could have been overlooked.

6. A diagnosis may have been made or advice given that was not written in the record.

In some cases, one might assume that there was insufficient time to establish a hypertension diagnosis. Glass and associates reviewed charts of emergency departments at three university-affiliated hospitals and reported that "less than half of all patients who had elevated blood pressures were recognized by physicians to be hypertensive" (5). These authors expressed the belief that lack of time and the emergency nature of the visit might have contributed to the low percentage of diagnoses. However, our study indicates that although 80 percent of the patients surveyed stayed in the hospital 4 days or more, the correlation between the length of stay and the diagnosis of hypertension was not significant.

Concerning the second reason for the low rate of diagnosis and of instruction about hypertension, it seems unlikely that 56 percent of the patients with one elevation of blood pressure would have failed to have another.

The third and fourth possible reasons for the low rate of diagnosis and instruction might be physicians' attitudes toward and perceptions of the significance of a single measurement and the significance of blood-pressure levels. Our study was not designed to evaluate these attitudes and perceptions.

In regard to the percentage of patients given advice about hypertension, it is possible that patients had been given advice, but this fact was never recorded in their charts. However, the Maryland baseline household survey revealed that among patients who had a DBP ≥ 95 mm Hg and had been discharged from the hospital within the previous 12 months, 28 percent (11 of 39) had not been told of their condition. This result lends credence to the possibility that some hospital patients are not informed of their elevated blood pressure nor given any advice about it.

Among patients who had an established diagnosis of hypertension, 38 percent had not been given antihypertension medication. Since the treatment rate did not correlate with length of hospital stay, a short stay could not account for the lack of drug treatment in this group. Thirty-four percent of the diagnosed hyper-

tensives with a DBP ≥ 100 mm Hg on at least one occasion were not on drug treatment, compared with 43 percent of hospital patients with a diagnosis of hypertension who had never had a DBP ≥ 100 mm Hg. According to State and national standards at the time of the study, only persons with a DBP ≥ 105 mm Hg needed to be treated with medication. Perhaps most of the 34 percent did not have a sustained DBP ≥ 104 mm Hg. It has been suggested that antihypertension treatment of some patients might have been discontinued in anticipation of elective surgery. We believe that such discontinuance is rarely necessary and, unfortunately, may convey to the patient the idea that treatment for hypertension need not be resumed after hospitalization unless the patient is specifically told to do so.

The study also revealed that patients with a DBP ≥ 100 mm Hg on admission were more likely to be diagnosed as hypertensive than those with a DBP reading of this level after admission. It could be that admission measurements are brought to the attention of a physician more readily during the admission workup or that subsequent DBP elevations are believed to be related to hospital events such as an operative procedure, and the physician considers such elevations to be transient. On the other hand, a number of studies have shown that the blood pressure of hypertensive patients often falls significantly below outpatient levels during the early days of hospitalization (6,7). In the Veterans Administration Cooperative Study, the average hospital DBP was 15 mm Hg lower than the average clinic DBP (8). And, according to Ayers and associates, "In hospitalized patients blood pressure is reduced with bed rest; thus any patient with an elevated blood pressure is to be followed as an outpatient to determine the course of blood pressure" (9). The finding of an elevated DBP ≥ 100 mm Hg during hospitalization should command as much, if not more, attention than a similar level recorded on admission.

Implications for Medical Practice

Although the results of this study are by no means definitive, they do suggest areas that health professionals in hospital practice may wish to investigate, and if they find problems exist, see if improvements can be made. First, it is possible that the intensive training and education of health professionals in hospitals to look for hypertension in blacks has been so successful that hypertension in whites, especially white males, is not being given adequate attention. Increased attention and response to elevated blood pressure in white males seems in order.

Second, the finding of an elevated blood pressure in

a hospital setting may not be given the importance that it should be accorded. The blood pressure may be considered to be elevated only because the person is in the hospital, or it may be ignored as a routine vital sign measurement. A need exists for providing advice and followup care whenever an elevated blood pressure is found.

Although blood pressure is highly variable, the results of screening in the Hypertension Detection and Followup Program showed, as did the Canadian study reported by Sacket and associates, that an elevated DBP on one occasion predicts a future elevation with an accuracy between 65 and 80 percent (10). In addition, the Framingham study has demonstrated that a single casual blood pressure determination is a good predictor of future cardiovascular risk. Hospitals should institute the procedure of flagging charts that contain a record of undiagnosed elevated DBP. The patient's blood pressure should be measured again, and if found to be elevated on two or more occasions, a diagnostic workup should be undertaken. If the DBP is found to be above 90 mm Hg, the patient should be told that he or she is at risk of developing high blood pressure and should have his blood pressure checked at frequent intervals after discharge.

It is possible also that once high blood pressure is diagnosed by health professionals, the diagnosis, its implication, and what actions should be taken are not communicated to the patient. In the Maryland household survey, when persons who had stopped their anti-hypertension medications were asked why, 70 percent said that they had stopped because the doctor had told them to, because they no longer had high blood pressure, or because they no longer needed the medication. Since these people had a DBP ≥ 95 mm Hg at the time of the survey, it is unlikely that their physicians had actually told them to stop taking their medication. It seems more likely that they had stopped because the communication between the physician and the patient was not clear. Also, when patients admitted to a hospital for elective surgery have their antihypertension medication stopped, there is a danger that they may believe that they do not have to resume their drug treatment when they return home.

Of the 330,000 adults 18 years or older hospitalized in Maryland each year (12 percent of the total adult population of the State), almost one-fourth will have a DBP ≥ 100 mm Hg or will have diagnosed hypertension. Since more than 90 percent of these hospitalized patients will return to the community, health professionals working in the hospital setting are in an excellent position to contribute to high blood pressure control. The implications of this study, reinforced by

the results of the household survey, indicate the need for more careful assessment of elevated blood pressure levels in hospitalized patients as well as for clear communication of instructions about hypertension to patients.

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SYNOPSIS

SHANKAR, BELAVADI S. (Maryland State Department of Health and Mental Hygiene), RUSSELL, R. PATTERSON, SOUTHARD, JOHN W., and SCHURMAN, E. W.: *Patterns of care for hypertension among hospitalized patients. Public Health Reports, Vol. 97, November-December 1982, pp. 517-527.*

In a sample of 19,210 adult inpatients discharged from Maryland

community hospitals in 1978, 1 in 4 had either an elevated diastolic blood pressure ≥ 100 mm Hg (3,338) or a diagnosis of hypertension (1,233). Among the patients with elevated blood pressure, hypertension was diagnosed in 44 percent, and 48 percent received advice concerning followup care. Likewise, of the patients with diagnosed hypertension, 72 percent were treated in the hospital, and 70 percent received advice concerning followup care. Age, race, and sex differences were significant.

White males were least likely to have hypertension diagnosed, to be treated for it, or to receive instruction about it.

The survey results were used by the Maryland State Department of Health and Mental Hygiene to formulate a statewide high blood pressure coordination plan and to construct modules for the education of professionals in high blood pressure treatment and control. A followup survey is planned to evaluate the effect of these efforts.

A Forum on the Public Health Work Force: Assessing the Current and Future Supply of and Requirements for Personnel

ADELE M. MILLER

CRITICAL SHORTAGES EXIST in the field of public health in physician epidemiologists, toxicologists, and other types of public health personnel. In some specialties, however, the major problem is a shortage of specific types of competency, not of numbers. These were the principal findings of a 4-day workshop entitled A Forum on the Public Health Work Force, which was held March 30–April 2, 1982, in Washington, D.C. The New Federalism and present-day constraints on resources, the forum participants concluded, will intensify competition for scarce health dollars, which in turn will prevent any significant expansion of the public health work force and reduce turnover of personnel. To meet the continuing demands placed on public health, more continuing education programs will need to be introduced to overcome the gaps in preparation of the persons currently employed and to improve their professional competency and managerial skills.

Cosponsored by the Bureau of Health Professions of the Department of Health and Human Services and

the American Public Health Association (APHA), the workshop provided, as its title suggests, a forum where experts could discuss methods to assess the supply of and requirements for the current public health work force and could project areas of oversupply and shortages, not only in terms of numbers but in specific competencies as well. The workshop also provided guidance as to the direction that the preparation and practice of public health personnel should take in the future.

Some 54 participants, in addition to staff of the American Public Health Association and Bureau of Health Professions (see box), were invited to share data and opinions relative to shortages and surpluses of specific public health specialists and to identify skills and knowledge that are not routinely available from existing full-time staff or consultants or through sharing arrangements among organizations. The participants included employers of public health personnel in addition to educators, practitioners, and representatives of professional associations.

The first day of the workshop, presided over by Thomas D. Hatch, Director of the Bureau of Health Professions, was devoted to a series of presentations about the public health work force, which established

Ms. Miller is the information officer for the Bureau of Health Professions, Health Resources and Services Administration, Public Health Service. Tearsheet requests to Adele M. Miller, Rm. 441, Center Bldg., 3700 East-West Hwy., Hyattsville, Md. 20782.

a common ground for small group discussions. Following the presentations, all participants were assigned to one of three Employer Work Groups to discuss the employment settings of State and local governments, academic and research institutions, and nongovernment organizations such as private industry, consultant or proprietary firms, professional associations, and voluntary agencies. Participants were then assigned to one of four Specialty Work Groups, which concentrated on environmental health, public health education, health services administration, and epidemiology and statistics. The seven work groups prepared position papers that focused on the workshop objectives.

Workshop Objectives

For each of the four selected specialty areas and the three employment settings, the objectives were as follows:

1. To determine the basis for statements about the supply, requirements, and competency of public health specialists.
2. To identify job categories, titles, or subspecialties for which shortages or surpluses of personnel exist.
3. To identify education and training needs by subspecialty.
4. To predict changes in the requirements for public health personnel over the next 5 years.
5. To develop broad recommendations for resolution of identified problems.

Supply and Requirements

The employment of public health personnel in any area is affected by many variable factors that interfere with the supply and demand function of the free market. Dr. Marc V. Roberts told participants in his keynote address. He noted that in a "perfect" occupational marketplace, economic forces—demand, wages, prestige, and benefits—are unconstrained and over a reasonably short time, balance each other to maintain work force equilibrium. Factors that render the public health marketplace "imperfect" include budget mechanisms in public organizations, civil service requirements, lower wages and prestige for public health specialties as compared with specialties such as medicine, and the long lead time required for the preparation of many types of practitioners. These factors create an economically "imperfect" industry and affect the supply of and requirements for public health professionals.

In other health areas, one can establish a target level of services and goods and multiply by the number of employees per target unit to determine the total number of employees needed. However, in public health,

the process of determining personnel supply and requirements is more complicated. The supply is, in effect, negotiated by society's willingness to accept or reject levels of ill health and wellness and involves considerable political and social debate. There are no natural benchmarks for the public health professions such as there are for other occupations.

How then can experts make any determinations? Roberts suggested that decisions be arrived at by using a management analysis in which estimates are made of the most cost-effective measures to provide an accepted target level of services. Planning experts must consider the rate of convergence between the effort to recruit adequate numbers of health professionals and the success of the effort to meet the changing incidence of targeted health problems. If in attempting to reach the desired level of services, training capacity is expanded too rapidly, a surplus will emerge. (The recent increase in medical school graduates and the alleged surplus of physicians is an example of such a phenomenon.) It is necessary to devise an appropriate strategy to converge on the target level more slowly, while simultaneously assessing the health problems that affect the work force.

At present, the country's general economic situation is causing a critical evaluation of the amount or level of services needed, the manner in which services are or should be delivered, and who should provide them. Roberts asserted that the appropriate level of public health professionals is determined by costs. What then determines the level of services? Obviously, the level is determined by what services society opts to provide.

Ultimately, the size of the public health work force depends on our ability to insure cost containment, to eliminate waste, fraud, and abuse, and to justify the service programs in the face of sophisticated challenges.

Control of Environmental Health Hazards

Can industry regulate and control environmental health hazards? A panel moderated by David B. Hoover, Acting Director, Division of Associated Health Professions, and consisting of three panelists, discussed whether industry could regulate itself and control environmental health hazards.

Ronald F. Coene said that he did not believe that industry could regulate itself because it does not have the resources to investigate and evaluate hazards, nor to provide surveillance and assume liability. However, he expressed the opinion that if management and labor, recognizing the need for safety in the workplace, joined forces, they could control environmental hazards.

Roberts pointed out that private corporations often exhibit a wide variation of responses to environmental

hazards, depending on the interests of the corporation. He noted that the public sector, since it is frequently insulated from public pressure, is sometimes the worst polluter. The Tennessee Valley Authority was at one time one of the worst polluters, but is now much improved, he said.

Dr. H. Daniel Roth suggested that industry cannot address certain problems because of their magnitude (for example, toxic substances). Private industry, he said, can address some localized occupational problems if it has real concern and is willing to identify health hazards and take corrective action. However, where issues are not clear, risks minimal, and evidence flimsy, it is difficult to get industry to support regulation.

Graduates of Schools of Public Health

The average age of graduates of U.S. schools of public health dropped during the 1970s below 25 years; the ratio of women to men became 1 to 1; and the number

of graduates without work experience increased. These data were presented by Dr. Frank I. Moore in discussing a demographic profile that he derived from 16 studies of graduates of U.S. schools of public health. The studies represented efforts by the schools to find out what became of their graduates once they entered the job market. The most significant finding from the demographic analysis was that at the very time that the workplace was growing more complex and economic trends predicted a reduction in the number of jobs available to newcomers, current graduates of public health schools were both younger and less seasoned by previous experience and professional training than in the past.

Six months after graduation, virtually all graduates who wanted jobs had found them, Moore's data showed. The graduates reported employment in a variety of functions and settings, including some outside the traditional sphere of public health. Indeed, the

Participants and Speakers at Forum on Public Health Work Force

Invited participants:

Donald E. Barber, PhD, School of Public Health, University of Minnesota, Minneapolis.

Franklin K. Brough, MPH, PhD, Utah Lung Association, Salt Lake City, Utah.

Claude A. Burnett, MD, Northeast Health District, Athens, Ga.

Betsy M. Chadderdon, MPH, University of Texas, School of Public Health, Houston, Tex.

Helen B. Cleary, DSc, Department of Family and Community Medicine, University of Massachusetts Medical Center, Worcester.

Ronald F. Coene, National Institute for Occupational Safety and Health, Rockville, Md.

Judith Craven, MD, MPH, Director of Public Health, Houston, Tex.

Janice M. Dodds, EdD, Teachers College, Columbia University, New York, N.Y.

Gary L. Filerman, PhD, Association of University Programs in Health Administration, Washington, D.C.

Gershon Fishbein, Environmental Health Letter, Washington, D.C.

David Fraser, MD, Centers for Disease Control, Rockville, Md.

Larry J. Gordon, MS, MPH, New Mexico Department of Health and Environment, Santa Fe.

Thomas L. Hall, MD, DrPH, Puget Sound Health Systems Agency, Seattle, Wash.

Susan Harris, MPH, JD, American Health Care Association, Washington, D.C.

Andrew Haynal, MD, MPH, School of Public Health, Loma Linda University, Loma Linda, Calif.

Arden C. Hyde, Coalition for Health and the Environment, Washington, D.C.

Joel Kavet, ScD, National Center for Health Statistics, Hyattsville, Md.

K. Paul Knott, MPH, American Red Cross, Washington, D.C.

Lawrence J. Krone, PhD, RS, National Environmental Health Association, Denver, Colo.

George A. Kupfer, MS, Bureau of Consumer Protection and Environmental Health, Milwaukee, Wis.

Corrine W. Larson, MS, Minnesota Department of Health, Minneapolis.

Peter J. Levin, ScD, College of Health, University of Oklahoma, Oklahoma City.

Christine Ling, MPH, Hawaii State Department of Health, Honolulu.

Stephen F. Loebs, PhD, Graduate Program in Hospital and Health Services Administration, Ohio State University, Columbus.

J. Newton MacCormick, MD, MPH, State Department of Human Resources, Raleigh, N.C.

J. Walter Mason, DSc, School of Public Health, University of Alabama, Birmingham.

Betty Maugans, Conference of State Sanitary Engineers, Landover, Md.

Dwight F. Metzler, Bureau of Water Supply, Kansas Department of Health and Environment, Topeka.

J. Michael McGinnis, MD, Office of Health Promotion, U.S. Public Health Service, Washington, D.C.

public health degree appeared to provide substantial opportunity for relevant employment and upward mobility within that employment.

Dr. Thomas L. Hall, in reporting on a survey of recent graduates—classes of 1978 and 1979 in 19 U.S. schools of public health—noted that the fate of new entrants into a particular labor force “will generally provide a valuable and inexpensive indication of the current balance existing between manpower supply and demand” (1). The results of the survey suggested a favorable job market for new public health professionals; four of every five of the respondents were employed, and 13 percent were enrolled in an educational program. Most of the adverse sex differentials in the job market seemed to have decreased or disappeared except for income: the survey showed that men continued to have substantially higher incomes after graduation than women.

Betsy M. Chadderson, speaking from the perspective

of a placement officer, stressed the need to help students improve their options and evaluate their choices. A variety of factors enter into the choice of a job, such as interest in people versus data, profitmaking versus nonprofit organization, and the social needs of the job-seeker and his or her family.

Assessment of Continuing Education Needs

A meager 3 percent of the total estimated U.S. 1980 public health work force of 500,000 attended the 583 continuing education courses offered during the 1980–81 academic year, said Dr. Edward E. Roulhac, in assessing the need for continuing education programs in schools of public health. A significant majority of our current public health work force, he said, may be practicing at a less than optimal level of competency because of inadequate exposure and access to continuing education. Obstacles to be overcome include (a) information overload, caused by a proliferation of journals,

Jerrold M. Michael, MSE, MPH, School of Public Health, University of Hawaii, Honolulu.

James A. Miller, MD, MPH, General Preventive Medicine Residency Program, Johns Hopkins University, Baltimore, Md.

Frank I. Moore, PhD, University of Texas, School of Public Health, Houston.

Patricia D. Mullen, DrPH, Office of Health Promotion, U.S. Public Health Service, Washington, D.C.

Michael Mulvihill, DrPH, Department of Community Medicine, Mount Sinai School of Medicine, New York, N.Y.

William S. Nersesian, MD, Bureau of Health, Maine Department of Human Services, Augusta.

Horace G. Ogden, Centers for Disease Control, Atlanta, Ga.
G. Nicholas Parlette, MPH, School of Public Health, University of California, Berkeley.

John A. Pendergrass, CIH, Occupational Health and Safety Products, 3M Company, St. Paul, Minn.

Kent W. Peterson, MD, Environmental and Preventive Medicine, IBM, White Plains, N.Y.

Otto H. Ravenholt, MD, MPH, Clark County Health District, Las Vegas, Nev.

P. G. Rentos, PhD, National Institute for Occupational Safety and Health, Cincinnati, Ohio.

Marc V. Roberts, PhD, Department of Health Policy and Management, Harvard School of Public Health, Boston, Mass.

H. Daniel Roth, PhD, Roth Associates, Inc., Rockville, Md.
Edgar E. Roulhac, PhD, MPH, School of Hygiene and Public Health, Johns Hopkins University, Baltimore, Md.

Christopher Schonwalder, PhD, National Institute of Environmental Health Sciences, Research Triangle Park, N.C.

Sidney Shindell, MD, Department of Preventive Medicine, Medical College of Wisconsin, Milwaukee.

Mervyn F. Silverman, MD, MPH, San Francisco Department of Health.

Harry Steigman, MPH, Pennsylvania Department of Environmental Resources, Harrisburg.

Mary Jane Suskind, MA, MPH, D.C. Department of Human Services, Washington, D.C.

Bailus Walker, Jr., PhD, MPH, Michigan Department of Health, Lansing.

Peter Weil, PhD, American College of Hospital Administrators, Chicago, Ill.

Karl A. Western, MD, ITPH, National Institute of Allergy and Infectious Diseases, Bethesda, Md.

Joan M. Wolle, PhD, Maryland State Department of Health and Mental Hygiene, Glen Burnie.

John C. Wong, MS(PH), EdD, California State University-Hayward, Calif.

American Public Health Association staff participants:

Seiko Baba Brodbeck

William H. McBeath, MD, MPH

Bureau of Health Professions staff participants:

Elizabeth Coleman, MPH

Anne Foglesong

Erwin Groner, MBA

Thomas D. Hatch

William Holland, MPH

David B. Hoover, MPH

Joseph Kadish, EdD

B. Jerald McClendon, MS

Ernest Michelsen, MA

Howard V. Stambler

periodicals, newsletters, monographs, self-instruction aids, and announcements instead of a systematic, meaningful, long-term exposure to appropriate continuing education interventions; (b) slowness in the transferring of new knowledge and techniques to the worksite, where they can be directly infused into the mainstream of public health practice; (c) failure to use modern high-level technologies to update instructional resources in continuing education courses; and (d) lack of commitment and agreement among consumers of continuing education (public health practitioners), providers (schools of public health), and supporters (employers, government, and professional associations) that would sustain a coherent continuing education initiative as a priority in the nation's overall future health policy.

Public Health Personnel in Industry

"Traditionally the responsibility for public health issues was seen as a government responsibility. However, the combination of legislation, public awareness, and corporate enlightenment has led to greater public health activity in private industry," said Arden C. Hyde. To encourage this mutuality of interest, institutions that train the public health work force need to know what skills are required to address health problems in corporate settings, and corporations need to know precisely what public-health-trained personnel can do for them. Such cooperation will promote the best interests of public health graduates by identifying employment opportunities in private industry. It will also encourage private industry to recognize the effect of employee health problems on overall productivity and efficiency and the role of private industry in improving health conditions in the workplace.

Prevention in Medical Education

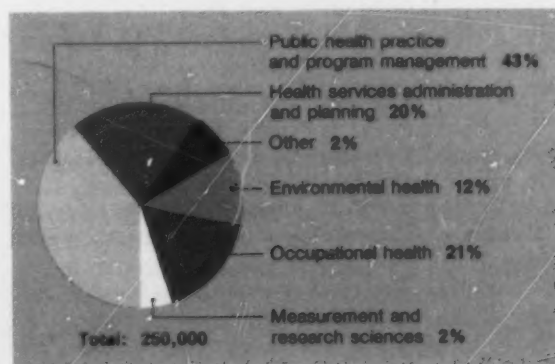
"The physician is in a strategic position to offer preventive services such as immunizations . . . [He] may be an effective motivator of lifestyle changes related to smoking, diet, and exercise . . . and has a special opportunity for triaging vulnerable patients to the prevention services of other health providers," said Dr. J. Michael McGinnis. "Medical education offers therefore an important opportunity of preparation for a preventive role," he added. Barriers to an expanded role for prevention in medical education, he said, include competition for student time and student interest, lack of interest of many on the medical faculty, overemphasis by physician-faculty on disease detection and management rather than on prevention and control, and lack of reimbursement of physicians for preventive care. However, McGinnis pointed out, oppor-

tunities exist in "teachable moments" when prevention can be integrated into the curriculum; and moreover, role models can be identified who have an interest in prevention. He encouraged deans to take the lead in ensuring that opportunities for change are not lost through neglect, lack of interest, or fragmentation of efforts. He listed other steps to enhance the occasions for including prevention in the curriculum, such as expanding opportunities during residency periods, focusing on prevention in annual meetings of professional societies, reviewing licensure and certification examinations for their preventive focus, encouraging private foundations to support the teaching of prevention, and instituting a Federal program to make change possible.

Available Data on Public Health Personnel

The difficulty of obtaining precise numerical estimates of shortages and surpluses in each public health specialty was discussed by Jerald McClendon. He pointed out the wide-ranging and multidisciplinary nature of the public health field, its lack of the comprehensive lists of personnel that licensing agencies or credentialing boards provide in other fields, and the tendency of public health personnel to identify themselves by their professions (for example, as physician, biochemist) rather than as public health specialists. As a result, estimates of the number of public health personnel are rough. In a 1982 report to the U.S. Congress on public health personnel as of 1980 (2), the primary public health work force of full-time professionals was estimated to be roughly 250,000 persons (see chart). Only 20 percent of the 250,000 had graduate training in public health. The best available estimates show that 43 percent of these full-time professionals were in public health practice and program management, 20 percent in health services administration and planning, 12 percent in environmental health, 21 percent in occupational health, and 2 percent in measurement and research sciences.

Primary public health work force by specialty



Expected changes in the employment of public health personnel in the next 5 years

Category	Rate of growth				No opinion or information	No response
	Negative	None or slow	Moderate	Rapid		
State government	4	17	10	1	1	2
Local government	5	14	13	0	1	2
Academic programs	7	16	6	0	3	3
Research organizations	1	17	11	1	2	3
Industry	1	4	19	6	1	4
Proprietary consulting firms	0	6	18	3	3	5
Voluntary agencies	4	14	9	0	5	3
Epidemiologists	0	12	13	4	5	1
Statisticians	0	14	11	1	6	3
Industrial hygienists	0	7	15	6	4	3
Sanitarians	1	17	6	1	7	3
Environmental engineers	0	13	9	7	3	3
Toxicologists	0	3	18	7	5	2
Health educators	1	13	13	2	4	2
Administrators	2	13	9	4	5	2

cupational health, 2 percent in the measurement and research sciences, and 2 percent in other fields such as population studies, behavioral sciences, family planning, and international health. McClendon challenged the workshop participants to help improve the estimates and conclusions in the report to Congress.

A New Survey of Public Health Personnel

For many years, public and community health has been the "stepchild of our analytical and data collection efforts," said Howard V. Stambler. The lack of definitive, objective hard data on the public health work force has precluded sound conclusions on the current and anticipated supply of and requirements for public health personnel. The need for a coordinated, sequential project to arrive at agreed-upon definitions, to identify the areas to be studied, and to institute studies on an incremental basis led to award of a contract in September 1980 to the American Public Health Association (3). As a result of that contract, Stambler said, we will begin the process of assembling reliable, quantitative work force data that will enable us to respond to a host of policy questions now being debated in the Department of Health and Human Services, the Congress, and the Office of Management and Budget. How many and what types of personnel are in the public health field? Is the current supply adequate? Are there distribution problems? What are likely to be the future demands for such personnel? Is the current rate of training adequate to meet those needs? What is the appropriate Federal role for supporting the training of public health personnel? Manpower analysis and data are critical to monitoring, understanding, and improving our health care system and the health of our citizens.

Dr. William H. McBeath discussed the problems inherent in designing a system for monitoring the supply of and requirements for professional public and community health personnel. One of the most difficult tasks, he said, is to arrive at definitions that are acceptable to as many interests as possible. To that end, the American Public Health Association convened a distinguished advisory group that has identified the most important elements to consider in arriving at definitions. APHA has also involved more than 30 representative organizations in a review of the project's draft products and has involved the leaders of its 24 specialty membership sections in a review of their sections' areas of particular interest. APHA is committed to establishing a lasting and effective system, he said.

Overview of Anecdotal Information

To help determine current perceptions of shortages or surpluses in the public health work force, a preworkshop assignment was sent to each participant. Anne Foglesong analyzed the responses and reported the results. The problem that was most frequently reported was the inability to compete with private industry in offering salaries that were attractive to experienced employees. The greatest difficulty was reported in hiring toxicologists, but hiring difficulties were also evident for epidemiologists, industrial hygienists, and environmental engineers. Little or no hiring difficulties were noted for statisticians, health educators, administrators, and sanitarians.

In relation to work settings, a moderate growth rate was expected in industry and in proprietary consulting firms (see table). Slow to moderate growth was expected in State and local government employment,

whereas zero to slow growth was expected in academic and research organizations and voluntary agencies.

Position Papers by Employer Work Groups

Three Employer Work Groups presented position papers (4).

State and local governments' personnel needs. The State and Local Government Employer Work Group concluded that in the next 5 years there would be an increased demand for public health services. However, because of relatively smaller means due to reduced Federal funding, some reduction in the scope of public health programs is expected. In addition, there will be less entry-level hiring because of diminished job mobility and response to requirements. The result will be an acute shortage of effectively trained personnel in functional areas, particularly of environmental health personnel skilled in toxicology, risk assessment, and hazard control. Little or no growth was projected for specialty areas such as public health nursing, maternal and child health, and nutrition, although the need for such personnel will persist.

An urgent need for substantial change in the training of public health personnel was recognized by the State and Local Government Employer Work Group. Environmental health personnel, for example, will need retraining in areas of toxic, chemical, and other hazards resulting from new materials and new manufacturing and distribution processes. Also, the education and training process should include more practical experience. To strengthen the capacity of public health agencies to cope with the challenges they will be facing, long-term continuing education should be provided to enhance management skills in the areas of finance, planning, statistics, and political processes.

Academic and research organizations' personnel needs. Specific areas of shortages of academic and research personnel were identified by the Academic and Research Organizations Employer Work Group. These included environmental and occupational health personnel, public health physicians, statisticians, toxicologists, health finance specialists, and epidemiologists. Cooperative relationships among public, private, and academic institutions to alleviate these problems should be promoted. Tax incentives would encourage the private sector to make funds available for research and would support the educational costs of the personnel required by industry. On the other hand, faculty of academic institutions could become involved in community problems through part-time practice or consultation. It would be necessary to provide faculty devel-

opment grants, special leave arrangements, and other innovative means to enable faculty to engage productively in practical problem-solving. Consortium agreements among public health campuses would also contribute to better use of scarce professional resources. Continuing education offerings that do not interrupt employment are necessary for a technically proficient work force. Such programs should include fiscal management and policy analysis so that public health academics can help legislators and public executives make informed priority determinations.

In summary, the supply of highly trained experienced faculty and research personnel remains limited, competition between the public and private sector is keen, and both short-range and long-range projections of the demand for such personnel indicate there will be difficulties in recruitment.

Private sector's personnel needs. The Private Sector Employer Work Group identified three major categories of employers with varying needs for public health personnel, namely, business and industry, voluntary nonprofit agencies, and direct providers of health services. Direct providers will need functional specialists in administration, health education, and environmental health who have field as well as didactic training. Budget constraints on national voluntary agencies may result in reduced staff, but the persons who continue to staff those organizations will require additional expertise in management, resource allocation, and political and technical areas.

Both health-related businesses (insurance and consulting firms, pharmaceutical and pharmaceutical supply houses) and nonhealth-related businesses (service and manufacturing firms) need to be sensitized to the contributions that persons trained in public health can make. Although many businesses employ such persons, they tend not to be thought of as public health personnel. Educators need to improve their relationships with business and industry so that they can attract industry-oriented personnel into public health training. They need also to identify curriculums that are oriented to industry needs and that will expand the employment potential of their graduates. Specific areas of interest to industry include managerial knowledge and communication skills, environmental health risk assessment and management, and cost-benefit analyses of environmental problems.

Position Papers by Specialty Work Groups

Four specialty work groups presented position papers on the personnel needs in their respective areas of specialization (4).

Epidemiology and statistics. The Epidemiology and Statistics Work Group projected that there would be little growth in jobs for epidemiologists in public agencies and academia because of funding constraints. However, the nongovernment sector, particularly consultant agencies and large industrial firms, could provide new career opportunities because of their need for studies to address pragmatic and relevant issues.

Because of the shortage of physician epidemiologists, the demand for nonphysician epidemiologists with doctorates will continue to be high, but inexperienced public health epidemiologists without a doctorate are likely to experience some difficulty in finding suitable employment in public health. Doctoral and postdoctoral training in epidemiology should be provided for established health professionals, along with other training initiatives, including short courses, continuing education, and external degree programs; such training should provide opportunities for field experience. To reverse the decline in physicians with training in epidemiology, a variety of programs are needed, including scholarships with preferential employment or repayment provisions and career rewards.

Slow growth is anticipated in the demand for the services of all statisticians over the next 5 years. Statisticians will require a strong background in data processing technology and analytical skills, as well as orientation to the multidisciplinary public health team and the substantive areas of public health practice.

Environmental health. Environmental health encompasses a broad spectrum of related specialties, which include but are not limited to air quality, food protection, hazardous substances, product safety, shelter, industrial hygiene, radiation protection, solid waste management, vector control, waste disposal, and the water supply. This diversity makes recruiting, education, research, and training in environmental health difficult. The spectrum of problems is so broad and is expanding so rapidly that the solutions require a cooperating partnership among official agencies, the general population, academia, agriculture, commerce, and industry.

The Environmental Health Work Group recommended that the environmental health work force be expanded to meet present and future needs despite cuts in funds and a shift in regulatory emphasis from Federal to State and local governments. The group predicted that the greatest shortage of adequately qualified personnel to serve the needs of both the public and private sectors would occur in the next 5 years in the problem areas of management of toxic substances and hazardous waste, occupational safety and health, and

water treatment. The group also recommended Federal support, in conjunction with State and local governments and industry, for training programs, incentives to encourage research and advanced study, and the establishment of national standards. Educational programs, in addition to developing technical competence, should include specialized training in the political process, the formulation of public policy, and communication skills.

Health education. The field of health education has a significant potential for contributing to the prevention of disease and the promotion of health. Health educators are employed in a variety of work settings—medical care, community health, school health, business and industrial sites, and academic or research institutions. However, a substantial number of persons currently filling health education positions in worksites outside of academia have no formal preparation or even continuing education in health education. In many cases, they have been trained in such areas as adult education and the social sciences. The Health Education Work Group pointed out the need for better preparation of health educators through improved training, including field experience, and also the need for support of research and evaluation. Extended degree programs, master's degree programs, and continuing education programs should be established. The work group recognized, however, that tight job markets and economic limitations make academic institutions reluctant to adopt such programs. The work group also recommended that a competency assurance program be established, which would include self-assessment, competency-based training, and the credentialing of health educators.

Health services administration. Health services administration encompasses those skills necessary to plan, develop, manage, and evaluate health programs, institutions, and health care systems. The Health Services Administration Work Group forecast a continued demand for health service administrators, with a probable increase in the private sector's demand and a decrease in the public sector's demand. The work group was unable, with the available data, to assess the degree to which production would balance the expected demand for new entry-level graduates. Generally, the group's members expressed the belief that the job market for new graduates was likely to become much more competitive in many administrative specialties, whereas selected specialties would remain in high demand. Relatively more training effort should be directed at upgrading the existing supply of health service adminis-

trators as compared with the production of new administrators.

A serious lack of faculty expertise poses the most significant training problem, which could be remedied through doctoral and post-doctoral training and field experience. The strengthening of curriculums, the establishment of external degree programs and continuing education programs, and linkages with public agencies and the private sector would help increase the relevance of training programs. New content areas should include financial management, health economics, epidemiology as a management tool, policy and the political process, marketing, and health law.

Summary and Critique

"The vagaries of sources and levels of financial support will continue throughout the 1980's and will force government and non-government providers of health services to undertake shifts in programs, services, and personnel in order to remain fiscally viable," said Dr. Bailus Walker, in summarizing the forum's deliberations. These circumstances will bring pressures to reduce the scope of health services and to change the organizational arrangements by which services are delivered.

Yet, despite these pressures, great demands continue. "A common thread in all the discussions of the forum was the recognition that the identification, evaluation, and subsequent modification of environmental and occupational factors in causing illness and premature death promise early and major payoff in the prevention of disease." There was considerable agreement that the current demand for environmental health personnel will increase substantially with public demand for more rigorous control of environmental and occupational hazards, and that the present and future need for toxicologists and epidemiologists (especially physician epidemiologists) will far exceed the supply.

The broader implications of disease prevention and health promotion were also highlighted in the forum. In a society that has been moving steadily toward more costly therapeutic approaches, especially those involving hospitalization, preventive approaches may come to be dictated on economic grounds alone. An even more persuasive stimulus, Walker noted, is the social advantage of eliminating or preventing the progression of disease or disability.

The redistribution of Federal, State, and local responsibilities, along with increased health care costs, will require the strengthening of management tools, the integration of a variety of services, and the coordination of facilities planning, health education, and manpower utilization. Health care managers, Walker said,

must be conditioned through education and experience to pursue these goals, and planners and statisticians must provide improved tools for rational planning and resource allocation.

These changes, Walker continued, should prompt "a discussion of how to redirect our educational programs to provide health service personnel with new skills and renewed confidence to engage in a creative partnership and improve the quality of service."

Unfortunately, he said, although we do not have sound data to prove the point, it appears that the most capable health science students are not opting for careers in applied public health services, especially in State and local governments. In these times of economic change, senior faculty members in academic departments are less available to students as role models, because they spend increasing amounts of time seeking financial support for their programs. In addition, Walker commented, the public image of public health professionals is poor; they are too often seen as inefficient and unimaginative bureaucrats protected by civil service regulations.

Walker argued that "all available signs point to a current and future general shortage of public health professionals in many categories of subdisciplines," which market factors do not seem to be able to counteract. The problem for public health agencies is compounded in several critical areas—such as occupational health and epidemiology—because highly trained graduates are being enticed by more lucrative opportunities outside organized public health services.

"Thus," Dr. Walker concluded, "it is imperative that the Federal Government retain and even intensify its key role in ensuring the stability of financial support for training and education in public health . . . and make training and education a priority within its internal structure . . ."

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Determinants of Nursing Home Costs in Florida: Policy Implications and Support in National Research Findings

HERBERT G. TRAXLER, PhD

THE NEED FOR LONG-TERM CARE (LTC) in institutions has increased dramatically over the past 30 years in the United States because of the increasing life expectancy and higher prevalence of chronic diseases in the population, fundamental changes in the American family structure and living arrangements, and the high mobility of the present-day Americans. Medicare, and especially Medicaid coverage of nursing home care for eligible populations, translated this need into effective demand in the mid 1960s. The 1954 amendments to the "Hospital Survey and Construction Act of 1946" (the Hill-Burton Act) already included grant assistance for the construction of LTC institutions. This coverage reinforced the vigorous industry response to the growing demand for LTC, increasing the number of skilled nursing facility (SNF) beds from about 200,000 in 9,000 homes in 1954 (1) to more than 1,400,000 beds in 18,300 facilities in 1977 (2). In other words (3):

The number, size and total bed capacity of long term care facilities increased dramatically after 1954 . . . while the number of long term facilities tripled, bed capacity increased eight times. There are now almost as many beds in long term care facilities as in hospitals in the United States.

Nursing homes today contain more than 1 million elderly, or about 1 in 20 persons over 65 years at any given time. However, as many as 20 to 25 percent of the nation's elderly will reside in a nursing home at some time (4). This statistic is reflected in the fact that the elderly overall spend 4 times, and those age 75 and over more than 6 times, as many bed-days in

nursing homes as in hospitals—16,000 nursing home days versus 4,000 hospital days per 1,000 population over 65 in 1978 (5).

This high demand for nursing home care, met by eager industry response, led to dramatic increases in the nation's nursing home bill, both in absolute and relative terms. Nursing home expenditures rose from \$28 million in 1940, less than 1 percent of the health expenditure total; to \$480 million in 1960, nearly 2 percent; to \$3.8 billion 10 years later, at 5.5 percent; and, finally, to \$20.7 billion for the year 1980, or 8.4 percent of total health expenditures.

The average annual increase in these expenditures at a 17.2 percent rate from 1950 to 1978 makes the nursing home sector the fastest growing health care component over that period. The average total monthly charge increased at an average annual rate of 10.6 percent from 1964 to 1977, from \$186 to \$689 (6). More than one-half of the 1977 total was paid for through Medicaid funds, accounting for more than one-third of total title XIX expenditures of \$17.1 billion for that year (7). On the other hand, a much smaller portion of Medicare (title XVIII of the Social Security Act) expenditures went for nursing home care, because of the more restricted scope of that program's nursing home component.

Health planning and regulatory activities are increasingly focusing on long-term care, as evidenced in State health and health systems plans and in numerous Federal and State laws, rules, and regulations governing nursing homes. However, despite extensive government regulation of nursing home costs, which include expenditure "caps" in effect in many States that are burdened with ever-rising Medicaid outlays for institutional long-term care, this area of the health sector has received little research attention until recently. For example, the wealth of cost-related data found in the mandated "Medicaid Cost Reports" has rarely been

Dr. Traxler is an economist in the National Center for Health Services Research (NCHSR), Division of Extramural Research. An earlier version of this paper was presented to the Economics of Aging Conference of the University of Missouri, Gerontology Institute, Kansas City, on April 4, 1981. Tearsheet requests to Dr. Herbert Traxler, NCHSR/DER, 3700 East-West Highway, Room 8-22, Hyattsville, Md 20782.

subjected to thorough analysis, nor has a sound theoretical basis for such analysis been established. This omission is in contrast to the attention devoted to the nation's hospital sector, which is larger in absolute terms, but whose growth rate has been slower than that of the less glamorous nursing home industry.

It is commonly agreed that the increasing life expectancy of a larger number and greater proportion of the elderly will require increasing investment and expenditures for both institutional and noninstitutional long-term care services. The likely expansion of the nursing home industry and the concomitant need to study and analyze related issues was clearly stated in the general conclusions of the U.S. Senate's Special Committee on Aging's report on "Nursing Home Care in the United States: Failure in Public Policy" (8):

There is every reason to believe that the need for high-quality long-term care facilities will continue to increase. One of the major reasons is that more and more people are living longer and longer. Individuals with multiple disabilities and advanced age are likely candidates for institutionalization.

Nursing Home Cost Factors

The nursing home production function is characterized by a productive capacity in terms of beds set up and staffed for use. The service orientation of the nursing home industry accounts for the predominant share of such variable cost components as dietary (food), laundry and linen, and nursing and supportive care in terms of total costs. Salaries alone account for about two-thirds of the total cost. Some major factors determining the cost of care mentioned in the literature are the level of care, bed size, location, profit or nonprofit status, and utilization (occupancy rate) (9). In an early study of long-term care facilities, ownership and size were found to be related: the average number of beds in skilled nursing homes was 18 in proprietary, 43 in "voluntary," and 69 in public facilities in 1955 (10). Since that time, the number, size and, consequently, total bed capacity of nursing homes has increased substantially, and the composition of the industry has changed. Of import for this study is the statistical relationship between size and unit cost, if any, and particularly the possibility of a "U-shaped" form of this relationship, when it is charted. This property would allow the determination of a hypothetical "optimal" size, that is, the lowest unit-cost size.

Another factor extensively covered in the health planning and institutional health care literature is the use or occupancy rate. Its impact on hospital costs led to the promulgation of a national minimum hospital occupancy standard of 80 percent in the National Resource Standards for Health Planning of March 28, 1978. For nursing homes, such high occupancy rates are

not unusual due to the long-term and more "predictable" nature of residency in these facilities and to the high demand for long-term care. These high use rates lead to waiting lists in many facilities and consequently to "administrative days" in hospitals for patients waiting to be transferred to nursing homes. Nevertheless, occupancy rates were found to be significantly related to unit costs in nursing homes.

Location of the facility also influences per diem costs. Both national (Bureau of Labor Statistics) and regional indices, like the Florida Price Level Index (FPLI) measure cost and price differences between and within States. Also, urban locations often have higher costs than rural locations. Other factors investigated in my study are the proportions of administrative costs and of title XIX (Medicaid) patients and some demographic variables. These variables are, for each Florida county, the percentage of elderly, the percentage change in the elderly population (1970 to 1976), and the proportion of the elderly in poverty in 1975 (11). Finally, the degree of unionization of health care sector workers is incorporated as a dummy variable on a county basis as an indication of supply-side cost factors that may strongly impact the labor-intensive nursing home industry.

Not investigated are factors related to quality of care, primarily because of the lack of reliable and specific data. It is assumed, however, that most of the unexplained variation in cost per day among facilities may be attributed to differences related to quality of care.

Descriptive Summary of Trends, 1971 to 1976

Data from Medicaid Cost Reports (MCRs) from 1971 through 1976 of about three-fourths of all Florida nursing homes and beds in service were used in the analysis. Florida started participating in the Medicaid program on January 1, 1970. As more nursing homes entered the program, a larger portion of all Florida facilities' MCRs were available for the study; the 1976 data base covers nearly 9 out of 10 licensed beds.

The per diem rates rose steadily from a statewide mean of \$15.84 in 1972 to \$21.51 in 1976; that is, by more than one-third. This increase is about equivalent to the concurrent rise in the Consumer Price Index (CPI) from 125.5 to 171.1. Calculating the mean rate by health systems agency (HSA) clearly shows three regional groupings: HSAs 1, 2, 3 (North Florida), HSAs 4, 5, 6 (Central and Southwest Florida), and the Southeast, Atlantic coast HSAs 7, 8, and 9. The last group, which covers Miami, Fort Lauderdale, and West Palm Beach, had the highest mean per diem costs throughout the 6-year period.

Florida is a highly urbanized State. Nearly nine-tenths of its population live in standard metropolitan statistical areas (SMSAs), compared with two-thirds of the population nationwide (12). More than twice as many MCRs analyzed were from SMSAs (901) than from rural nursing homes (409). Consistent with the hypothesis and findings of this study, the 6-year mean per diem for urban facilities, \$18.84, was higher than the rural per diem of \$17.84. This \$1 difference hypothetically could have added to a \$36 million savings, had the urban homes been paid at the rural mean rate over the 6 years. This urban-rural differential persists through all 6 years, and it is also reflected in the Florida Price Level Index. The FPLI is the result of strong concerns expressed by State employees, legislators, and private parties alike over the large differences in the cost of living and of operation within Florida. Since 1972, the FPLI has been established annually. It is based on a legislatively mandated "study of price level differentials among the counties of the State of Florida conducted by the Department of Administration" (13).

The FPLI confirms the pattern set by the per diem costs. It is consistently above the statewide mean level of 100.00 for the "Gold Coast" HSAs 7, 8, and 9, and below 100 for the North Florida HSAs 1 and 2.

The mean size of nursing homes increased from 102 beds in 1972 to nearly 108 in 1976. It varied greatly by region and county, and the urban homes were one-third larger than the rural group. The 6-year mean of 86.7 beds for facilities in the more rural North; 102.7 for HSAs 4, 5, 6; and 118 for the urban Southeast HSAs 7, 8 and 9 reflects the predominance of rural or urban characteristics in these three regional groupings.

Florida's nursing homes evidenced relatively high occupancy rates throughout the 1970s. In 1975 and 1976, the rate was increasing to a mean of 92.7 percent. An interesting inverse relationship between size and occupancy rate is evident in the data. Partial differentiation results in negative sign-coefficients for per diem cost-size, per diem cost-occupancy rate, and also for size-utilization relationships. This effect means that both are inversely related with per diem costs and with each other.

Finally, a unionization dummy variable for Miami (Dade County) and Jacksonville (Duval County), the only two areas experiencing any sizable degree of unionization of health sector workers, was overshadowed by regional price differentials expressed in the FPLI or, even stronger, in the three regional dummy variables. The proxies explaining the demand for health care by the elderly show some urban-rural differences. Relatively more elderly persons reside in Florida's rural counties, and a higher proportion of

these are in poverty (21.54 percent versus 15.1 percent in the SMSAs in 1975).

Model Specification and Framework

At the time of the study, I was not aware of other econometric analyses of nursing home costs at either the State or national level. Since that time, I have come across an analysis by Meiners, performed concurrently and independently, which supported the findings of my Florida study (14,15). He used national survey data. Furthermore, an excellent review of recent studies on nursing home costs was published in the spring of 1980. In her review, Bishop surveys the cost function in economic theory, major nursing home cost function studies, the choice of independent variables, and the status of research of nursing home costs (16). She concluded that:

nursing home cost function research has succeeded in confirming that certain variables are associated with nursing home costs in a systematic fashion. These include occupancy rate, ownership and provider type, location, and level of care. Costs also vary with patient mix and services offered, but these relationships are not as consistent; this is to be expected, given the theoretical and measurement problems of these product descriptors.

As mentioned earlier, I included all of Bishop's variables, except for "patient mix and services," which are related to quality of care, since I, too, encountered the theoretical and measurement problems of these product descriptors that Bishop mentions. Only the proportion of Medicaid residents was incorporated into my model as an indicator of patient mix, but it was of minor importance in explaining variations in per diem costs.

Based upon literature research, and 6 years' work experience in the Florida Department of Health and Rehabilitative Services, I formulated the major hypothesis: there is a quantifiable relationship between nursing home costs and occupancy (utilization) rate, location, urbanization, the share of Medicaid (title XIX) residents, unionization, some demographic variables and, finally, the size of the facility. Among the specific hypotheses tested were that size is inversely related to per diem costs over the existing range, in a U-shaped functional form. Furthermore, that geographic location, more specifically location in urban SMSAs and higher cost areas, as measured by the FPLI, is in direct and significant relationship to unit costs. Use, on the other hand, is in a significantly inverse relationship. These and other hypothesized relationships among major variables (path model) are illustrated in figure 1. The model employed is:

$$Y_i = a_i + B_1X_{1i} + B_2(X_{1i})^2 + B_3X_{2i} + B_4X_{3i} + \dots + B_mX_{mi} + e, \text{ with } m \text{ independent variables and}$$

i facilities observed over the 6-year period. The data sources for each variable of the model are explained in table 1.

Econometric Analysis of Nursing Home Costs

The original model incorporated the variables delineated in figure 1 and table 1. The final version uses the log 10 of the occupancy rate (variable X_2), which reflects the nonlinear relationship of this variable to unit costs. The regression reads ($R^2 = .448$):

$$Y = -11.691 - 34.146X_2 + .150X_{14} - .031X_1 + .126X_4 + 4.267X_5 + .000044X_1^2 - .084X_{11} - .107X_{12} + 1.546X_{10} - 1.236X_5 + .976X_7$$

[R 1]

Table 2 summarizes the regression results for this econometric cost model, including the overall F statistic. All variables included are significant at the .05 level.

The regression presented previously and in table 2 shows that occupancy rate, the CPI (which measures the impact of inflation over the period investigated), government control, and nursing home size and location—as measured by the FPLI—explain more than two-fifths of the total variation in unit costs. The remaining variables add little explanatory power to those five top variables. Streamlining the model gives the following regression equation ($R^2 = .425$, $F = 180.45$; beta coefficients are in parentheses under each variable):

$$Y = -21.427 - 32.929X_2 + .149X_{14} - .015X_1 + (-.547) \quad (.444) \quad (-.146) \\ .180X_4 + 4.597X_5 \\ (.153) \quad (.110)$$

[R 2]

Occupancy rate, the CPI, size, and the FPLI come in with the expected signs. The only possible surprise might be the positive sign of the government control variable X_5 . However (16a):

Cost studies have consistently found that facilities owned and operated by nonprofit voluntary and government organizations have higher costs than for-profit nursing homes by at least several dollars per day.

The strong regional and urban-rural diversity was expected to be more strongly reflected in unit cost differences than is evidenced by the explanatory power of the FPLI in the previous regression equations. The model was therefore structured to incorporate three regional dummy variables, one each for the lower cost HSAs 1, 2, 3 (North X_{15}); HSAs 4, 5, 6 (Central X_{16}); and the high-cost HSAs 7, 8, and 9 (Southeast X_{17}). Inclusion of these variables leads to the regression results in which the Southeast dummy variable (X_{17})

Table 1. Variables employed and data sources

Variables	Data source and location
Dependent	
Y = cost per patient day	Medicaid Cost Reports (MCR), Department of Health and Rehabilitative Services, Jacksonville
Independent	
X_1 = size of facility (licensed beds)	MCR, calculated available bed days.
X_2 = occupancy or utilization rate	MCR, calculated by dividing total patient days into available bed days.
X_3 = urban-rural (SMSA-non-SMSA)	MCR and "Florida Statistical Abstract."
X_4 = location-related cost input factors	FPLI—Annual report to the legislature by the Florida Department of Administration (1972–76 only).
X_5 = percent administrative costs	MCR, calculated by dividing administrative into total expenditures.
X_6 = percent Medicaid patient days	MCR, calculated by dividing Medicaid days into total patient days.
X_7 = degree of unionization	Florida nurses' associations, Public Employees Relations Commission, AFL-CIO Office in Florida.
X_{8-10} = control	MCR; X_8 = government; X_9 = private nonprofit; X_{10} = private for profit.
X_{11} = percent elderly, 1976	"Florida Statistical Abstract 1977," estimates for July 1, 1976 (calculated).
X_{12} = percent elderly in poverty, 1975	"Older People in Florida: A Statistical Abstract: 1976" (University of Florida, Gainesville).
X_{13} = change in the percent elderly, 1970 to 1976	"Florida Statistical Abstract" 1972 and 1977 (calculated).
X_{14} = annual Consumer Price Index, 1971 to 1976	U.S. Bureau of Labor Statistics
X_{15-17} = regional (HSA) grouping	X_{15} HSAs 1,2,3; North Florida X_{16} HSAs 4,5,6; Central Florida X_{17} HSAs 7,8,9; Southeast Florida

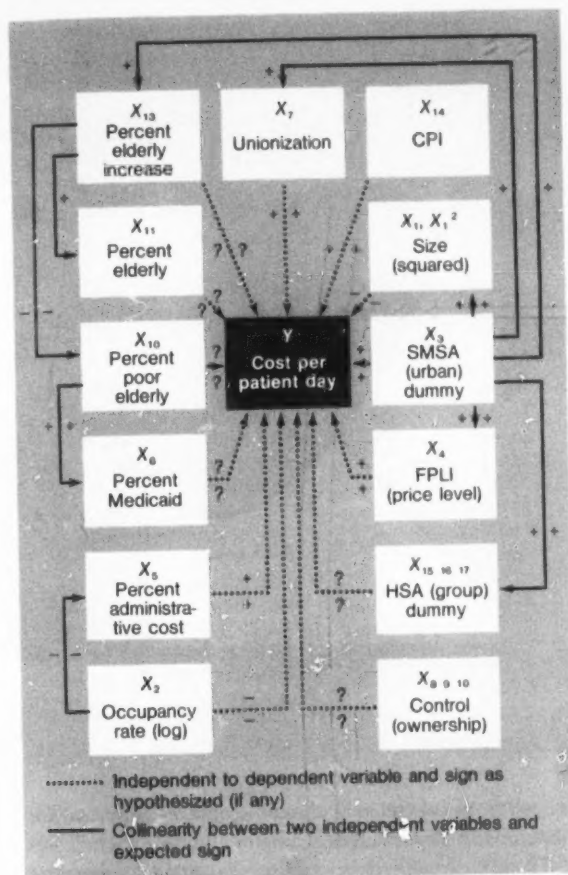
completely overshadows the impact of the FPLI (X_4) and of the SMSA dummy variable (X_3); neither variable consequently enters as a predictor. Reduction to a highly efficient and manageable five-variable model is as follows ($R^2 = .476$; beta coefficients in parentheses below):

$$Y = -4.9 + .15X_{14} - 25.83X_2 + 2.28X_{17} - .01X_1 \\ (.585) \quad (-.456) \quad (.220) \quad (-.27) \\ + 2.74X_5 \\ (.094)$$

[R 3]

Figure 2 illustrates the relationships and relative

Figure 1. Hypothesized model of the relationships among variables



strength of independent variables in the final model R 3 and compares it to the previous 5-variable model R 2. The cost per patient-day is found to be highly and positively correlated with the CPI (X_{14}), nega-

tively with the log 10 of the occupancy rate (X_2) and with size (X_1), and positively with location in the high-cost southeast Florida coastal area (X_{17}) and with government control (X_9). The comparison with the earlier discussed 5-variable regression R 2 presented in figure 2 shows replacement of the FPLI by the stronger Southeast HSAs' regional predictor, as well as the reversal of X_2 , occupancy rate, and X_{14} , CPI.

Analysis of regressions run separately for the 6-year urban (SMSA) and rural data set shows an urban outcome similar to that of the combined regression ($R^2 = .4227$, $F = 122.12$ at the .05 level of significance, and beta coefficients are indicated in parentheses):

$$Y = -25.74 - 34.36X_2 + .15X_{14} + 7.90X_8 + .22X_4 - .014X_1$$

[R 4]

Regression of the 409 Medicaid Cost Reports' data submitted by non-SMSA nursing homes over the 6-year period shows only the log 10 of occupancy rate, CPI, and size entering the model at the .05 level of significance ($R^2 = .5$, $F = 128.12$, beta in parentheses):

$$Y = -3.69 - 31.968X_{14} + .150X_2 - .025X_1$$

[R 5]

The hypothetical "optimal size" was calculated for the U-shaped cost-size relationship by partial differentiation. Taking the first derivative of the final five-variable regression, R 3, and setting it equal to zero results in a minimum-cost size of 356 beds. Figure 3 illustrates this size-cost relationship. Interestingly enough, an identical optimal, that is, lowest cost-size range, was suggested in Meiners' analysis of national survey data (14a).

Entering the calculated optimal values for size and

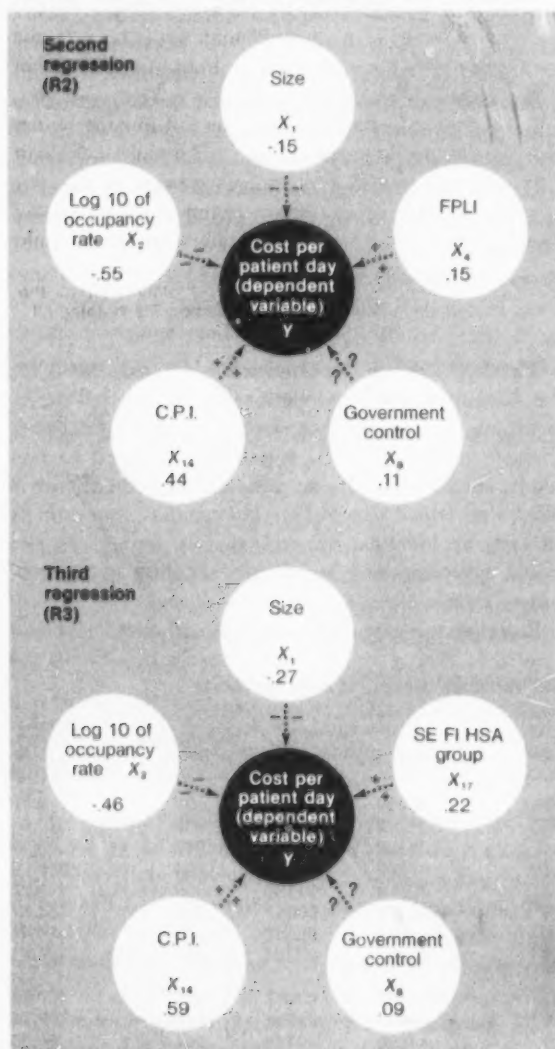
Table 2. Summary tables of regression R 1 (all variables except regional variables)

Variable number and name	Beta coefficient	R ²	R ² change	Significance level	Overall F value
X_2 Log 10 of occupancy rate	-.568	.20369	.20369	.000	313.86
X_{14} Consumer Price Index	.446	.37723	.17354	.000	371.31
X_1 Size (capacity)	-.315	.39192	.01469	.000	263.18
X_4 FPLI (regional cost differential)	.107	.41267	.02075	.000	215.00
X_8 Government control	.104	.42543	.01186	.000	180.45
X_1^2 Size (capacity) squared	.181	.43116	.00662	.000	154.37
X_{11} Percent elderly in 1976	-.120	.43677	.00562	.001	135.27
X_{12} Percent poor elderly in 1975	-.109	.44122	.00444	.002	120.41
X_9 Noncorporate private control (individual, partnership, or other)	.052	.44398	.00277	.014	108.15
X_5 Percent administrative costs	-.049	.44637	.00234	.023	98.18
X_7 Degree of unionization	.047	.44816	.00184	.047	89.85

NOTE: FPLI Florida Price Level Index.

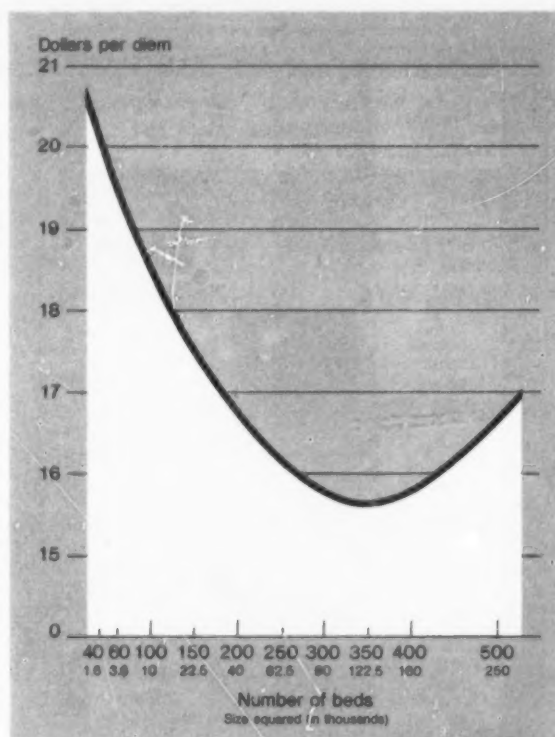
size squared (X_1 and X_1^2) and the means for all the other variables into the regression equation and solving for Y , for the total Florida data set, we obtain \$15.84 as the hypothetical 6-year average minimum per diem cost at the optimum size. If all Florida homes had averaged this cost instead of the actual \$18.53 mean for the 6-year period, the hypothetical savings would have amounted to \$136.3 million. The urban areas, that is, the SMSAs, would have accounted for \$103.5 million, or three-fourths of the calculated total "savings." Despite the hypothetical nature of the optimal size (range) and the associated minimum cost, this

Figure 2. Comparison of five-variable models, using the Florida Price Level Index (FPLI) and the Health Systems Agency (HSA) group, respectively, as indicator of regional cost differentials in terms of their standardized beta coefficients



NOTE: Expected signs are indicated per figure 1 and substantiated by regression results.

Figure 3. Size-cost relationship for the 6-year data set as calculated from regression R 3, holding all other variables entered constant

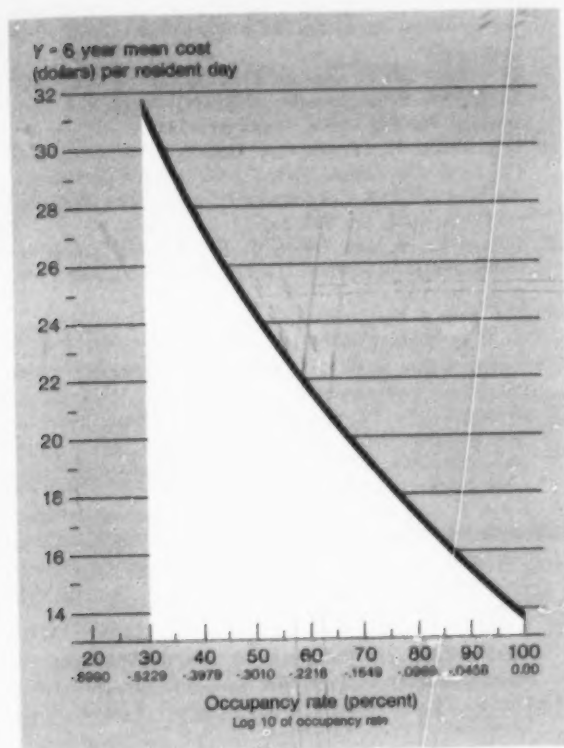


finding is nevertheless indicative of the potential for substantially lower overall nursing home expenditures in Florida through policy action directed at increasing the average size of nursing homes.

Table 3. Hypothetical mean per diem rates related to changes in the occupancy rate (OR)

Mean per diem rate	OR in percentages	Marginal cost reductions with each 10 percent improvement in OR
\$37.72	20	
\$34.41	25	\$6.02
\$37.70	30	
\$27.43	40	4.27
\$24.12	50	3.31
\$21.39	60	2.73
\$19.14	70	2.25
\$18.11	75	1.98
\$17.16	80	
\$15.82	87.5	1.75
\$15.41	90	
\$14.61	95	
\$14.15	98	1.56
\$14.00	99	
\$13.92	99.5	
\$13.85	100.0	

Figure 4. Occupancy rate-cost relationship for the 6-year data set as calculated from regression R 3, holding all other variables entered constant



The cost-occupancy relationship is also of great interest. Holding all other values constant, the cost-occupancy relationship is depicted in table 3 and figure 4 which show the strong reduction of per diem costs with improving utilization. This trend is especially evident at the lower occupancy ranges. In terms of a cost-containment strategy, concentration on the improvement of low occupancy rates is preferable to attempts to raise high utilization levels even higher. It may mean the closure or consolidation of underused small facilities or of wings of larger homes.

The rate of inflation, as expressed by the CPI, impacts upon the nursing home industry's costs beyond the relative increase in the CPI itself. This effect is the result of partial differentiation of the 6-year Florida data set, and it is presented in figure 5. The often-expressed concern over the cost-escalating impact of inflation on nursing homes, and thus indirectly on a large portion of the States' Medicaid budgets, seem well substantiated by this analysis.

Policy Implications of Study Findings

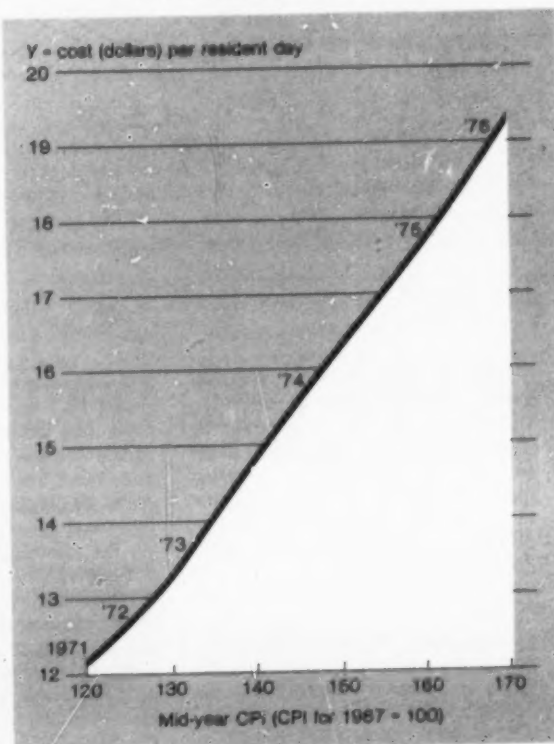
Regression analysis of an extensive data set from 6 years of Medicaid Cost Reports explains about one-

half of the variation in the per diem cost of nursing home care in Florida. This finding means, of course, that one-half of the variation in unit cost remains unexplained by this study. Most of this unexplained variation probably relates to "quality of care," which needs to be studied in its cost impact by measuring its structure, process, (subjective) patient satisfaction, and (objective) health status outcome. In addition, organizational structure, managerial skills, patient mix and characteristics, and staff "quality," morale, and turnover need also to be studied to enlarge our knowledge of nursing home operations and their functional cost components.

Nevertheless, the following policy implications can be drawn from this analysis:

- Reduction in the rate of inflation would reduce the rate of increase in nursing home costs by a factor of one-third to one-half greater than the change in the CPI itself.
- Improvement in the occupancy rate of nursing homes with persistently low rates of use will reduce per diem costs significantly. This change is especially true for larger homes. Closing or merging homes with low use rates through de-licensing or similar measures could

Figure 5. Consumer price index (CPI)-cost relationship for the 6-year data set, calculated from regression R 3, holding all other variables entered constant



lead to a substantial reduction in unit cost, thus alleviating the upward pressure on States' Medicaid budgets.

- Larger, more cost-efficient facilities through consolidation of homes, for instance, or the sharing of services such as medical direction, dietary planning, or various types of activity programs and therapy services would lead to a further reduction in cost.

- The factors behind the high unit costs of government-controlled nursing homes (usually county facilities) need to be further investigated. High costs may be attributable to their high administrative or payroll cost per patient-day, which do not necessarily contribute to better patient care.

- Placement of public-pay residents into nursing homes located in lower cost areas to the extent it is humanely possible without disrupting their family ties or other human or locational attachments should be considered. The calculations performed in this analysis show that many millions of dollars could be saved each year by such a policy in one State alone.

- Publication of nursing home costs and charges to enable both policymaker and consumer to make informed decisions and judgments might positively affect public policy through incentive-disincentive structuring as well as individual consumers' choice of less expensive nursing homes.

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SYNOPSIS

TRAXLER, HERBERT G. (National Center for Health Services Research, U.S. Department of Health and Human Services): *Determinants of nursing home costs in Florida: policy implications and support in national research findings. Public Health Reports*, Vol. 97, November-December 1982, pp. 537-544.

Descriptive and econometric analysis of the major nonquality determinants of nursing home costs for Florida shows that mean costs, size,

and occupancy rate increased between 1971 and 1976, that per diem costs and occupancy rate were inversely related, and that the per diem cost was lower in rural than in urban areas. Regression of the data shows that—next to inflation, as expressed by the Consumer Price Index—the occupancy rate accounts for most of the variation in per diem costs, followed by size, urban-rural location, and by type of control. The hypothetical "optimal," defined as lowest cost-size range, was calculated to be more than 350 beds. Recent research

substantiates most of these findings.

Medicaid Cost Reports from Florida's nursing homes were the source of the information analyzed; by 1976, the sixth year of the study, the data base covered nearly 9 of 10 licensed beds in the State.

Some policy implications can be drawn from the analysis. Reductions in per diem costs could be achieved by higher occupancy rates, especially in the larger nursing homes, and a reduction in the rate of inflation would reduce the rate of increase in nursing home costs.

The Socioeconomic Distribution of Mortality Rates in Des Moines, Iowa, 1974

R. SCOTT FREY, PhD

THE ECONOMIC POSITION of a population group determines its life chances (1-3). Consider, for example, mortality: mortality rates of groups vary inversely with socioeconomic status (4-10). This generalization and the observation that cities consist of relatively distinct geographic areas inhabited by people who share similar socioeconomic characteristics (11) suggest the following hypothesis: the lower the socioeconomic status of the population in an area, the higher the mortality rates. This hypothesis is consistent with research findings reported over the past 100 years for cities in this country and abroad (5,7,8, 12-36).

Despite a substantial body of research examining the posited relationship, relatively little research has been based on data collected since 1970 (27, 29-36). Moreover, the findings of several recent studies suggest an increase in socioeconomic differentials of various cause-specific forms of mortality over the past few decades (34,35). Although it is not possible to examine the validity of the reported increase in socioeconomic differentials, a consideration of data collected since 1970 would add to the understanding of the current status of the relationship. Thus, with this objective in

mind, I report the results of an examination of variations in the 1974 rates for 15 categories of death (including total mortality) across socioeconomic areas within Des Moines, Iowa.

Data and Methods

Mortality data. All deaths that occurred in the incorporated city of Des Moines in 1974 were identified from records supplied by the Des Moines-Polk County Health Department. The census tract was the unit for the geographic classification of each death. In the enumeration of the 1970 census (37), Des Moines was divided into 47 tracts. Four of the 1,846 reported deaths and 1 census tract (No. 35) were omitted from this analysis because of incomplete data. Each of the remaining 1,842 deaths was assigned to 1 of the 46 tracts according to residence and a general cause of death according to the Ninth Revision of the International Classification of Diseases, Clinical Modification (38).

Socioeconomic areas. The 46 census tracts were aggregated into 3 socioeconomic areas. Three areas were constructed because (a) the small number of cases for several causes of death necessitated using a small number of socioeconomic areas and (b) previous researchers have used three areas in their analyses (14,19,30). In effect, the use

of three socioeconomic areas is defensible for methodological reasons.

Aggregation of census tracts proceeded in two steps. First, Shevky-Bell (39) social rank scores were computed for each tract according to the following formula:

$$SRS_i = OSS + ESS \div 2$$

where, SRS_i = social rank score for census tract i ($i = 1, \dots, 46$); $OSS = 100 - [x(r - o)]$, OSS = occupation standardized score for census tract in 1970, r = occupation ratio score for census tract (number of craftsmen, foremen and kindred workers, operatives except transport, and laborers except farm per 1,000 employed persons), $x = 100 \div$ range of occupation ratios (r) for all census tracts, and o = lower limit of distribution of occupation ratios (r) for all census tracts; $ESS = 100 - [x(r - o)]$, ESS = education standardized score for census tract in 1970, r = education ratio score for census tract (number of persons completing a maximum of 8 years of education per 1,000 persons 25 years and older), $x = 100 \div$ range of education ratio (r) for all census tracts, and o = lower limit of distribution of education ratio (r) for all census tracts. Shevky-Bell social rank scores were used because they were used by previous researchers (16,17,25,26). Second, tracts were ranked from low to high according to social rank scores and then ag-

Tearsheet requests to Dr. R. Scott Frey, Assistant Professor, Department of Sociology, George Washington University, Washington, D.C. 20052.

gregated into three groups, consisting of a relatively equal number of tracts and representing areas of low (I), middle (II), and high (III) socioeconomic status. The three socioeconomic groups, social rank scores, population figures, and number of deaths are presented in table 1.

Standardized mortality ratios. Sex-specific standardized mortality ratios (40) were computed for each of 15 general categories of death (table 2) by socioeconomic area according to the indirect method. The formula for the ratio follows:

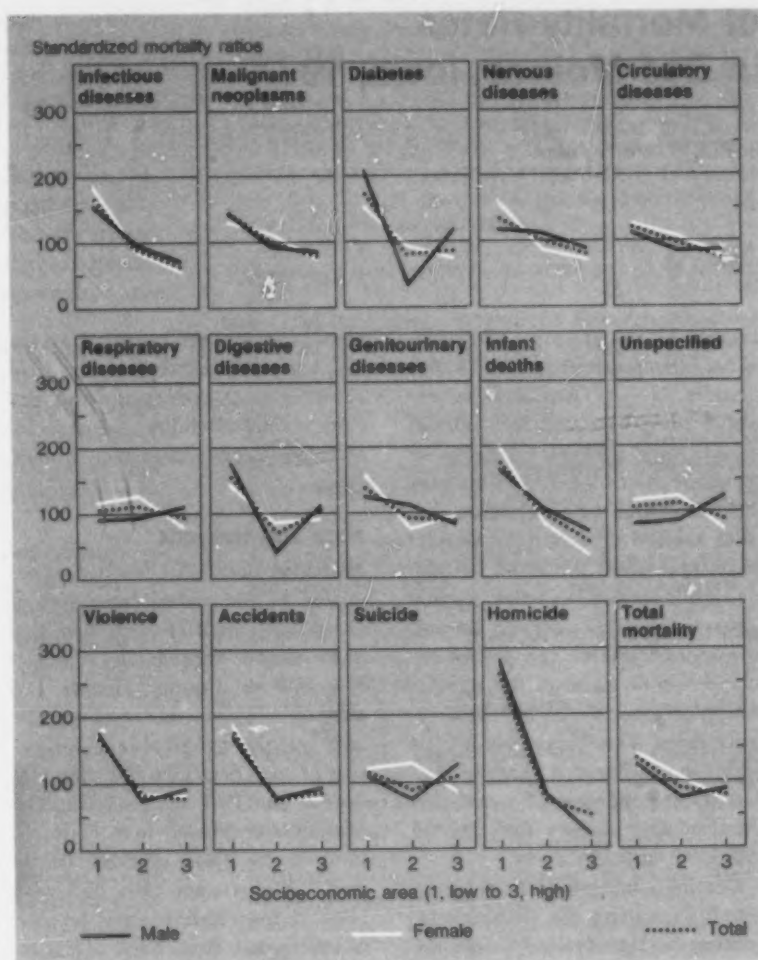
$$SMR_i = \frac{\sum_{j=1}^9 m_j p_j}{\sum_{j=1}^9 M_j p_j} \times 100$$

where, SMR_i = standardized mortality ratio for socioeconomic area i ($i = I, II, III$); j = age category (1 = under 5 years, 2 = 5-14, 3 = 15-24, 4 = 25-34, 5 = 35-44, 6 = 45-54, 7 = 55-64, 8 = 65-74, 9 = 75+); m_j = death rate in age group j in 1974; p_j = population in age group j in 1970 (37); M_j = death rate in age group j in 1974 for standard population (Des Moines).

As used here, the standardized mortality ratio is an age-standardized ratio that compares the extent to which observed deaths in a socioeconomic area vary as a percentage of the expected number of deaths if age-specific rates for the city occurred in the socioeconomic area. The ratio is 100 when observed and expected deaths are equal, and a score of less or more than 100 indicates a rate deviating from the expected rate.

Shortcomings. The following shortcomings are associated with the data and methods used in the analysis:

Standardized mortality ratios for 15 categories of death (including total mortality) by socioeconomic area and sex, Des Moines, Iowa, 1974



- the reliability of mortality data (41) and census tract data (42),
- the use of 1970 census tract population characteristics and 1974 tract mortality rates when population characteristics of tracts may have changed between 1970 and 1974,
- census tract homogeneity (43, 44),
- the manner in which mortality rates were computed (45-47),
- standardizing infant deaths (children under 1 year old) according to the population under 5 years old because data for the number of live births were not available,
- the use of a small number of

cases in computing mortality ratios for several causes of death, and

- the inability to generalize aggregate findings to the individual level (48,49).

However, I assume that these shortcomings do not vitiate the results reported here regarding the socioeconomic distribution of mortality rates. Such an assumption is realistic because the results presented in the next section are consistent with previous research findings.

Results

The results are presented in table 2 and the chart. The data reveal

Table 1. Census tracts grouped into three socioeconomic areas by Shevky-Bell social rank (SR) scores, Des Moines, Iowa, 1970

Tract	SR scores	Population	Deaths
Area I (low)			
36	.001	1,034	16
38	22.961	1,393	16
42	34.624	2,396	26
18	38.431	2,828	31
17	42.304	2,694	27
21	44.562	5,696	66
37	45.006	3,204	40
25	46.254	647	38
20	47.645	1,687	19
13	54.044	4,195	48
12	54.987	4,928	62
19	54.990	4,637	35
14	55.059	2,510	38
27	55.166	3,091	42
23	56.689	1,454	37
Area II (middle)			
33	57.713	2,949	40
44	58.272	4,102	19
46	58.311	8,240	57
5	58.404	5,632	52
3	59.405	4,025	31
39	60.284	1,524	9
43	61.249	6,674	41
15	61.979	3,284	39
2	62.715	7,518	60
1	63.465	9,069	41
4	63.684	5,427	55
6	65.428	4,697	50
34	65.515	2,558	43
16	65.747	2,262	43
47	65.928	4,934	25
26	66.023	2,687	25
Area III (high)			
24	69.033	2,012	16
45	70.708	6,351	44
11	73.819	5,976	43
41	75.706	3,661	37
40	79.870	3,694	25
29	83.084	4,712	72
8	84.406	12,412	92
9	84.750	8,586	80
7	85.858	14,163	78
28	85.915	4,437	53
10	85.958	5,485	53
31	97.433	2,239	9
30.01	97.683	2,667	17
20.02	97.991	4,208	35
32	100.000	2,573	19

partial support for the hypothesis—partial in the sense that not all forms of mortality vary inversely and monotonically with socioeconomic status. For instance, an in-

verse and monotonic pattern is seen for deaths of males due to infectious diseases, malignant neoplasms, nervous diseases, circulatory diseases, genitourinary diseases, in-

fant deaths, and homicide. Females show a pattern consistent with that of males for total mortality and mortality due to infectious diseases, malignant neoplasms, diabetes, nervous diseases, circulatory diseases, infant deaths, and violence. Similarly, the total population shows an inverse and monotonic pattern for total morbidity and mortality from infectious diseases, malignant neoplasms, nervous diseases, circulatory diseases, genitourinary diseases, infant deaths, and homicide.

Although several categories of death do not vary inversely and monotonically with socioeconomic status, ratios for the lowest socioeconomic area (I) are higher than the ratios for the upper two areas for most categories of death. Males from area I display higher ratios than males from areas II and III for 12 of 15 categories of death: infectious diseases, malignant neoplasms, diabetes, nervous diseases, circulatory diseases, digestive diseases, genitourinary diseases, infant deaths, violence, accidents, homicide, and total mortality. The ratios for females in area I are higher than those in the upper two areas for 11 of 14 categories of death: infectious diseases, malignant neoplasms, diabetes, nervous diseases, circulatory diseases, digestive diseases, genitourinary diseases, infant deaths, violence, accidents, and total mortality. The total population's pattern is similar to that of males and females for 12 of 15 categories of death: infectious diseases, malignant neoplasms, diabetes, nervous diseases, circulatory diseases, digestive diseases, genitourinary diseases, infant deaths, violence, accidents, homicide, and total mortality. In effect, the findings indicate that most categories of death vary as an inverse function of socioeconomic status.

Table 2. Standardized mortality ratios¹ for 15 categories of death by socioeconomic area and sex, Des Moines, Iowa, 1974

Category of death ²	Socioeconomic area			P(χ^2)
	I (low)	II (middle)	III (high)	
Infectious diseases (000-139)	174	96	63	NS
Male	³ 159	³ 98	³ 68	NS
Female	189	³ 95	³ 58	NS
Malignant neoplasms (140-239)	139	100	79	.001
Male	139	91	85	.020
Female	135	110	75	.010
Diabetes (250)	162	77	86	NS
Male	³ 202	³ 38	³ 104	NS
Female	150	98	76	NS
Nervous diseases (320-389)	130	101	83	NS
Male	³ 111	³ 104	³ 90	NS
Female	³ 152	³ 97	³ 76	NS
Circulatory diseases (390-459)	118	102	88	.010
Male	106	99	98	NS
Female	130	105	81	.001
Respiratory diseases (460-519)	101	104	96	NS
Male	90	94	111	NS
Female	112	116	81	NS
Digestive diseases (520-579)	160	60	101	.010
Male	170	42	110	.010
Female	150	81	91	NS
Genitourinary diseases (580-629)	141	93	84	NS
Male	127	106	78	NS
Female	152	³ 77	92	NS
Infant deaths (760-779)	172	98	58	.020
Male	155	102	65	NS
Female	200	91	³ 47	NS
Unspecified (780-799)	104	109	91	NS
Male	³ 84	93	115	NS
Female	118	121	74	NS
Violence (E800-E969)	167	78	85	.001
Male	169	75	87	.010
Female	164	84	82	NS
Accidents (E800-E949)	177	76	81	.010
Male	173	76	84	.050
Female	184	75	77	.100
Suicide (E950-E959)	108	86	108	NS
Male	107	73	120	NS
Female	³ 109	119	³ 79	NS
Homicide (E960-E969)	256	³ 72	³ 48	.010
Male	273	³ 77	³ 21	.001
Female	...	...	...	...
Total mortality	129	97	87	.001
Male	123	91	95	.001
Female	135	104	79	.001

¹ Ratio of observed to expected deaths $\times 100$.

² Categories based on the Ninth Revision of the International Classification of Diseases, Clinical Modification (38).

³ Based on fewer than 5 cases.

Conclusions

This study was designed to test the hypothesis that, in 1974, mortality rates varied inversely over three socioeconomic areas in Des Moines. If the shortcomings of the data and the method are not viewed as overly

problematic, the hypothesis cannot be rejected. That is, socioeconomic differentials in mortality rates continue to exist. However, the failure to find a pattern in which rates for all categories of death vary consistently as a negative and monotonic

function of socioeconomic status suggests that several categories of death do not vary strongly with socioeconomic status.

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Evaluating the Observable Effects of Foster Grandparents on Hospitalized Children

SUZANNE ZIEGLER, PhD
JOHANNA KING, PhD

THE EFFECT OF HOSPITALIZATION ON CHILDREN HAS been discussed in the clinical and sociological literature for at least three decades. The interest in this topic reflects a general concern about the effect that lack of a parental relationship may have on children's physical and mental development. The key figure expressing this concern has been Bowlby (1).

Many studies in institutions, including acute care and chronic care hospitals, have focused on the effect on children of the interruption of, or the lack of, parental nurture. The classic study in the literature on anaclitic depression in infants, conducted by Spitz (2) in an orphanage, demonstrated extreme differences in development between parented and unparented children. Even earlier, Edelston (3) had documented behavior disturbance in young hospitalized children that he attributed to separation from parents. Several review articles cover the work done in this area since the forties (4-6). Although many studies of the effects of hospitalization on children have diverse objectives, methods, and results, they show a cumulative pattern from which we can derive some significant conclusions.

1. Hospitalization tends to most negatively affect children between the ages of 7 and 54 months (4-9).

2. Within the age span 7-54 months, either lengthy or repeated brief hospitalization has long-range negative effects (10,11).

Dr. Ziegler is research coordinator, Child in the City, a program at the University of Toronto, and Dr. King is a psychologist at the Counseling Center, California State University at Chico. The project described was made possible by a contribution from the Atkinson Foundation, Toronto. The administrative and nursing staff of the Hospital for Sick Children in Toronto assisted in the study by providing subjects and data.

Teaser sheet requests to Johanna King, PhD, 1505 Manzanita Ave., Chico, Calif. 95926.

3. The presence of the parent or a parent surrogate tends to have a positive effect on the behavior of children and to ameliorate some of the negative effects of hospitalization (12-14).

Although studies of the nonmedical effects of hospitalization on children have been numerous and generalizations based on this literature can be made, certain methodological problems plague such studies and make them, in the aggregate, less conclusive than one might expect.

The central problems are (a) arriving at an operational definition of the negative effects of hospitalization on children (both during and after the experience) and (b) finding an appropriate method to collect the study data. A few studies depend on observers to supply data; most, however, depend on reports from hospital staff, parents, or both. Neither observers' reports nor self-report scales are tested for reliability over time or between raters, and rarely do any two researchers use the same instrument or try to replicate the conditions and constraints of previous studies.

The use of observers to provide data on children's behavior has the advantage over parental or staff reporting of the same behavior in that it is immediate rather than retrospective and is objective rather than subjective—provided that high inter-rater reliability is established. Observation, however, is costly compared with subjective reporting, even when it involves only a single measure of response, such as the pulse (15) or blood pressure (16). And since observation of higher level, more complex responses is far more difficult and costly, it is consequently rarely used. Also, molar behaviors—constellations of simpler, or molecular behaviors—are difficult to define in truly independent terms. (Molecular dimensions describe "elementary physical

states and movements," and such descriptions "can usually be made accurately and in terms which are easy to communicate." But, "with molar categories, an inference has already been made about the 'point' of a piece of behaviour, and many implicit expectations must enter into such descriptions since they involve an element of inspired guesswork" (17). Even when the problem of defining behaviors has been resolved, the establishment of inter-rater reliability in describing the presence or absence of these molar behaviors is in itself challenging (17), and few experimenters have used blind ratings or multiple observers (5).

Few studies to evaluate the effects of the presence of parents or parent-surrogates on the behavior of hospitalized children have been conducted that have not depended exclusively on anecdotal reports; that have had a satisfactory experimental design (including an appropriate control group plus clearly defined, mutually exclusive behavioral criteria); and that have established a satisfactory level of inter-rater reliability.

Although good research and evaluation studies are lacking, programs seeking to expand the contacts between parents and hospitalized children and to supply parent-surrogates when necessary have proliferated. Such efforts may be justified on humanitarian grounds alone, but these grounds may be insufficient both for investigators with an interest in the phenomenon of separation anxiety and its long-term consequences and for those making decisions about the funding of such programs, which must compete with other programs for funds.

Foster Grandparent Programs

Since 1965, the U.S. Government has made funds available to Federal regions for what are called Foster

Grandparent Programs, and such programs have been adopted by many pediatric hospitals and many pediatric wards of acute and chronic institutions. In these programs, men and women of retirement age are paid a modest salary for acting as friendly visitors to unvisited or undervisited hospitalized children. When possible, persons bilingual in English and another language commonly used in the region (typically Spanish) are chosen. The major goal of the programs as far as the children are concerned is to "render supportive, person-to-person services to children with special or exceptional needs" (18).

For hospitalized children whose parents cannot, or do not, visit regularly for whatever reasons, the foster grandparent serves as a surrogate parent. His or her job is to visit at the same time every day (or at least every weekday) and converse with the child much as a concerned and caring relative might do. The visitor may help the child with routines like eating or walking to the washrooms or playroom and may engage in informal activities with the child, like playing games, reading stories, or discussing a television program. For children who would be rarely visited otherwise, the Foster Grandparent Program provides an adult who belongs to the child for a set period every day, who does not have to be shared, and whose attention is not constantly diverted, as is inevitable with the nursing and medical staff.

Some efforts have been made to evaluate the effectiveness of Foster Grandparent Programs. In 1966, for example, data on about 900 children served by some 500 foster grandparents all over the United States were assembled from a variety of persons and records (19). The children were of all ages and were in various kinds of institutions. On the dimensions tapped in the evaluation, about half of the children reportedly improved

in the course of their contact with the foster grandparents. The interviewing was systematic and standardized, but no control group was used in the study, and no standardized outcome variables were measured. Similarly, in a 1975 survey, 38 randomly selected Foster Grandparent Programs (25 percent of all such programs) were systematically sampled. Staff members in the 38 programs were asked to answer a set of questions. Eighty-nine percent of the project personnel reported that the children's progress was accelerated by the foster grandparents, and 82 percent said that the program resulted in earlier termination of special treatment for the children (20). More recently, McGregor reported on the first year of a foster grandparent program implemented in two children's institutions in Australia and modeled on the American scheme (21). Responses to questionnaires administered before and after the program was carried out showed that the foster grandparents and supervisory staffs saw positive benefits from the program to the children (aged 2-16 years) over the 4 or 5 months of the study. A standardized measure of functioning (the Bayley scales) that was used in the study revealed small but significant improvement in the development levels of the children in the two institutions, but in this study, as in previous ones, there was no control group.

Only one systematic evaluation of Foster Grandparent Programs has been done that produced quantified, comparable results. Saltz, using standardized intelligence and maturity scales, systematic observations, and ratings by the institutional staff, compared infants and preschool children residing in two comparable children's institutions, one of which was served by a Foster Grandparent Program (22-24). Controls were available for 33 infants under 1 year old, but for only 14 of the toddlers. Significant differences in favor of the infants with foster grandparents were found in vocalization behavior but not in the results of a standardized test of developmental progress (the Cattell Infant Intelligence Test). Stanford-Binet results for the 14 pairs of experimental and control toddlers showed a 5-point gain after 12 months of the program for the groups with foster grandparents, compared with a 6-point loss for the control group, a difference that is significant at the 0.95 level of prediction.

Saltz found a measurable difference in the development of toddlers with foster grandparents compared with other institutionalized toddlers over 2 years of age, but she found no measurable difference for infants. Furthermore, her measures of improvement in ability and maturity are not suitable for use in an acute care setting where hospitalization is measured in days or weeks, not months or years. Yet the pediatric wards

of acute care hospitals are common settings for Foster Grandparent Programs. Because the Foster Grandparent Program is so widespread in acute care settings in the United States, as well as in chronic care settings, and because this typically 2-hour-per-day substitute parenting is generally the best alternative for hospitalized children who are never or infrequently visited, a series of systematic evaluations of such a program in operation, with quantifiable measures and a control group, needed to be done.

Branstetter (14) compared children in institutions who had parent visitors or foster grandparent visitors with unvisited children. Three groups of 10 children each, aged 14-36 months, were assigned to one of the following conditions: (a) mother present, roomed in with child, (b) substitute mother (foster grandparent) present at least 6 hours per day, and (c) mother absent—no substitute. The children were observed naturalistically on eight occasions (twice a day for 4 days) during their first week of hospitalization. "... the substitute mothering group showed behavior similar to that of the mother-present group. These two groups manifested *much less disturbed* behavior than did the mother-absent group." The general variables measured in the study included "dependency, aggression, social interaction, social isolation-withdrawal, play, curiosity-attention, autonomous activities, self-oriented activity (autoeroticism), crying and fear." A methodological flaw, however, weakens these results. Some observations about the children were made when parents and foster grandparents were present, so that the setting during the period of observation was not comparable to the setting of the unvisited group of children, in which visitors were never present. When further analyses were done based only on observations made when no visitors were present in any child's room, 5 of the 12 significant differences in behavior disappeared (written communication from Branstetter received in 1979). Nevertheless, significant intergroup differences remained in respect to seven variables; the most significant differences ($P = \leq 0.001$) were in play behavior, withdrawal, and egocentric speech.

In Branstetter's study, mothers and mother substitutes were with the child most of his or her waking hours. Except in a brief experimental program, however, it would be unrealistic to expect mother substitutes to spend that much time with a child. In the usual Foster Grandparent Program, 2 hours is the upper limit of time that the adult spends with the child. A question that arises therefore is: Will the substitute mother (the foster grandparent) be effective enough in a relatively brief 2-hour-per-day contact with the child to produce results in the child resembling those of a

more constantly present natural parent? Our study addressed this substantive question, as well as some methodological issues. It did not address the issue of the effects of the Foster Grandparent Program on the caregivers—the foster grandparents—and thus, it is not a complete evaluation of such a program.

Methods

The sample. We set out to test the impact of a Foster Grandparent Program on children in an acute care setting by gathering quantifiable data on both an experimental group and two control groups. The 67 children who served as subjects for the study were all patients at the Hospital for Sick Children in Toronto, Ontario. They are described in table 1. Sixty-four of them were 7 months through 4 years and 11 months old, and three were either 5 or 6 years old. Forty-three were hospitalized for 10 to 30 days; 4 for 6 to 9 days; and 20 for more than 30 days. Three groups of children, roughly matched for age and length of stay, constituted the entire study sample. It was not possible to control for diagnosis, but having as a criterion a minimum length of stay of 1 week eliminated children with relatively minor procedures, such as tonsillectomies. From the original 96 children selected for the study, 29 had to be dropped because of early discharge from the hospital, transfer to another hospital, or death. The 67 remaining children were divided into an experimental group with foster grandparents ($N = 26$), an undervisited control group ($N = 21$), and a parent-visited control group ($N = 20$). No information was available to us except age, record of previous hospitalization, and diagnosis. All children under age 5 who were admitted to the hospital during the 4 months of the study and whose diagnosis suggested a stay of at least 1 week and not more than 4 weeks were accepted until we filled each of the three treatment groups. Three older children were taken because younger ones were not available; also, several children were kept in the hospital longer than we had estimated they would

be. Acceptance into the study was controlled so that the three treatment groups would be matched for age, previous hospitalization, and diagnostic category as these related to the projected length of hospitalization.

The experimental group was comprised of children who either were not visited in the hospital or were undervisited by their own families and to whom we assigned a foster grandparent for 2 hours each weekday afternoon for the duration of their hospital stays. We defined undervisited as 5 or fewer hours of visiting per week. The first control group was made up of similarly unvisited or undervisited children, but no foster grandparents were assigned to them. These children received whatever individual social and emotional care and support that the nursing and recreation staff could give. A weakness of our study was that we had no way to document this staff time. Assignment to one or the other of these two groups was random.

The second control group was composed of children who were visited frequently by their parents. "Frequently" was defined as 10 or more hours of visiting per week; in many cases, parents were with their children for 6 or more hours every day, including weekends.

Although children in the three treatment groups were matched by age, length of hospital stay, and previous hospitalization, no effort was made to match them by sex because in previous research no differential responses to hospitalization had been found for boys and girls. A significant intergroup difference in the number of days of observation per child was found. Children in the age group 12–18 months were overrepresented in the group with the greatest number of days of observation, but this difference did not seriously affect the comparability of results, since there were no significant correlations between the number of observation days and any of the behavioral variables.

Instruments and procedures. Two specific assessment difficulties are evident throughout much of the litera-

Table 1. Characteristics of the sample by age group

Characteristic	Age in months				Total ($N = 67$)
	6–11 ($N = 12$)	12–18 ($N = 19$)	19–36 ($N = 23$)	37–62 ($N = 13$)	
Number previously hospitalized	9	10	17	10	46
Mean length of stay in days	31.8	32.5	28.4	37.7	31.6
Median length of stay in days	21	21	21	19	...
Mean numbers of observations per child	40.8	56.8	46.1	43.1	47.6
Number in experimental group (with foster grandparents) ..	5	7	10	4	26
Number in control group 1 (visited by parents)	2	7	8	3	20
Number in control group 2 (undervisited)	5	5	5	6	21

ture on the effects of hospitalization on children. The first is the lack of agreement on just what aspects of children's in-hospital behavior are most vulnerable to the effects of hospitalization, with the resultant lack of efforts at replication. The second difficulty is the lack of clear dimensions for some of the behaviors investigated and the consequent lack of a definition of what behaviors are maladaptive.

We created a form to assess six behavioral dimensions. At the top of this behavioral observation rating form, there was space to enter the child's name, the date, the observer's name, the ward, and the room number. Under each behavioral dimension except miscellaneous behaviors, three to six mutually exclusive and exhaustive alternatives were established, ranging from the least to the most adaptive behaviors. These six dimensions with their respective alternatives were as follows.

1. Vocalization:
 - Uncontrolled screaming, panic, frozen
 - Hard crying, strong verbal protest
 - Intermittent crying/mild verbal protest
 - Silence
 - Calm noncrying vocalization
2. Motor behavior (if child was asleep, no rating was done):
 - Thrashing about/hyperactive
 - Awake, but still
 - Moving about
3. Play behavior:
 - Not playing
 - Holding a toy but not playing
 - Playing
4. Fear:
 - Fearful/panic response
 - Anxious/apprehensive/irritable
 - Calm
 - Apparently happy
5. Environmental responsiveness:
 - Apparently oblivious to environment
 - Minimally responsive (visually alert but little or no motor response)
 - Responsive (motor as well as visual)
6. Miscellaneous odd behaviors:
 - Thumbsucking
 - Rocking
 - Picking at self
 - Masturbation
 - Other (describe)
 - No odd behaviors

Time samples of 6 successive 20-second periods per observation, with time in between for recording, were used. (The amount of time for recording data was not standardized.) The six dimensions we used are obviously molar, rather than molecular, and a certain amount of inference is necessary in such categories as "calm," "apparently happy," or "apparently oblivious to environment."

Two raters were used. Inter-rater reliability was calculated by having two observers use the form simultaneously for 1,000 trial observations; 84 percent agreement was obtained. In the course of the study, all observations were blind, in that the observers did not know to which group any child belonged.

Our hypotheses were that control group 2 (unvisited children) would least frequently show adaptive behavior; the behavior of the parent-visited children would be the most adaptive; and the behavior of children in the experimental group, those with foster grandparents, would fall in between and be more like that of the parent-visited children than of the unvisited children. Because our total numbers per group were small (table 1), it was not possible to test these hypotheses for specific age groups.

Results

Few instances of extreme behavior were recorded. No screaming was reported, and only three children were ever observed to cry hard. Only one child was observed to thrash about. No child exhibited a panic-stricken response. Only three children ever appeared to be oblivious of their environment (while awake). Exaggerated or autoerotic behavior was so rare that the category "miscellaneous odd behaviors" was dropped from the analysis. On all but one of the remaining five behavioral variables, all three groups were above the middle of the range in the adaptive direction (table 2). Thus, the children in our sample, whether in the experimental or control groups, were not characterized by observable manifestations of disturbed behavior.

Our first hypothesis was tested in a three-way analysis of variance; our second was tested through paired comparison tests. In both cases the support for our predictions was weak. The five behavioral variables are interdependent, and the intervariable correlations were all significant. But for only one of the behavioral domains, were the differences between groups significant; namely, play behavior, on which control group 2 was significantly lower (that is, the children were observed to play less) than the other two groups. In control group 2, the children played only 11 percent of the time they were under observation, compared with 16 percent for the experimental group and 22 percent for

Table 2. Means and standard deviations (SDs) for five behaviorable variables for the three groups of children under observation

Behavioral domain	Whole sample (N = 68)	Control group No. 1 (parent-visited) (N = 20)	Experimental group (foster grandparents) (N = 26)	Control group No. 2 (undervisited) (N = 21)
Vocal:				
Mean	4.13	4.15	4.14	4.07
SD	.23	.26	.23	.20
Motor:				
Mean	2.64	2.65	2.63	2.65
SD	.18	.23	.14	.18
Play:				
Mean	1.43	1.54	1.40	1.28
SD	.32	.41	.26	.20
Emotional:				
Mean	3.00	2.98	3.03	2.97
SD	.14	.15	.15	.11
Responsiveness to environment:				
Mean	2.57	2.57	2.58	2.54
SD	.23	.25	.21	.21
Mean across the 5 domains	13.77	13.91	13.78	12.51

¹ $P \leq 0.04$.

control group 1. The mean scores in the five behavioral domains were, as we hypothesized, lowest for the undervisited group in four of five cases. In three of the four analyses with nonsignificant results, also, the mean score for the experimental group was closer to that of the parent-visited group than to that of the undervisited group. However, a multivariate analysis (with Wilk's criterion test) showed no significant overall effect attributable to membership in a particular group. Thus, our results are inconclusive and cannot be offered as convincing evidence that foster grandparent visitors or parent visitors cause hospitalized children to be more contented or responsive.

We had planned to compare the subsequent adjustment to home of the three groups of hospitalized children, based on Vernon's parent-rating scale of the posthospital emotional readjustment of children (5), but we had to abandon this project because the response rate from parents of children in the unvisited control group was too low. Thus, our observational ratings are the only measure that we have of intergroup differences, and although they do not contradict either of our research hypotheses, neither do they support them.

Discussion

The results of our experiment were disappointing in that the anticipated pattern of intergroup behavioral

differences (in which the children with the foster grandparents would resemble the parent-visited children more than the undervisited children) emerged too weakly to confirm the effectiveness of the foster grandparent intervention. Overall, the expected pattern (in which the mean scores of children with foster grandparents would be between the mean scores of the two control groups) was observed, but the intergroup differences, except in respect to play behavior, were too small to reach statistical significance, and therefore we cannot predict replicable results with confidence.

The clear implication of our results is that if Foster Grandparent Programs are to be judged on the basis of the foster grandchildren's behavior in the absence of their foster grandparents, the programs are a failure. The children are not observably more responsive, happier, or more tranquil for having had such visitors. Nor for that matter are the behaviors of children whose own parents regularly visit them distinguishable in this respect—when the parent is absent—from the behaviors of children with no visitors. How do we reconcile these results with those in the experimental literature cited earlier, which suggest that the negative effects of hospitalization on young children are to a large extent due to their separation from parents?

The answer appears to be that in those few studies in which two or three groups were compared (for example, visited versus unvisited children) and in which significant intergroup differences were found, a variable that was not controlled for was the differing effect that a visitor's presence had on a child's behavior when an observer was present and absent. Besides Branstetter's study, we reviewed three others in which significant differences were found between the most-visited and least-visited children. In Brain and Mackay's study (13), children were observed several times when they were visited by their mothers (who roomed with them) as well as when they were alone. The several observations were aggregated for each child. Mothers who did not room in may have been present during some of the observation periods, but undoubtedly during many fewer periods than the room-in mothers.

Similarly, Prugh and associates (12) observed "the behavior of child and parents on admission and during visiting." The 19 children in the control group were studied under normal conditions for that hospital—very limited visiting hours for parents and little encouragement for parents to participate in the ward care of their children. The matched experimental group of 19 children were studied at a later point, when an experimental program had been effected by the hospital that included an expanded visiting schedule for par-

ents and the integration of one parent's role in the ward care of the child. Observations in this study were aggregated with others made during play programs, traumatic procedures, and so forth. Again, one can assume that the number of observations made in the presence of visiting parents was likely to be significantly higher in the experimental group.

In the third study, Robertson and Robertson reported on foster parents' observations of their children in a nonhospital situation (25). They were always present, of course, at the time of the observation.

Only in our study, and in part in Branstetter's, were visited and undervisited children compared under similar conditions, that is, in the absence of the visitor. Branstetter's results indicate—and the contrast between our results and those in the studies just cited supports the idea—that the presence of a parent or parent surrogate during an observation is a critical intervening variable in the relationship between visits made to young children in the hospital and the behavior of those children in the hospital. Because the rate of return of parent questionnaires by one of the three experimental groups was inadequate, we could not reliably compare the three groups as to their posthospital behavior. Therefore, our study must stop with the observation of children's in-hospital behavior, saying nothing about the long-term effects of hospitalization.

Implications for Foster Grandparent Programs

On the basis of our results, as well as those of Branstetter and others, certain recommendations can be made about programs of the foster grandparent type. Since surrogate-parent visitors (or for that matter, natural parents) appear to have the most significant positive effects on children when they are actually with them and appear to have little mitigating effect on the children's behavior when they are not, two courses of action are indicated.

1. The parent or parent-surrogate should be allowed to spend as much time as possible with the child in order to maximize the period when the child is observably most active and involved.

2. The parent or surrogate should be encouraged to be with the child at the time of the child's maximal anxiety, since the presence of a visitor seems to lessen anxiety. Such times include hospital admission, painful or unpleasant procedures, bedtime, before an operation (during induction of anesthesia), and after an operation (in the recovery room). Yet on many such occasions parents and other visitors are typically barred from being with the children, even though these are the

periods when such visitors are perhaps most necessary and helpful to the child.

Although we cannot argue that the effectiveness of parent surrogates such as foster grandparents extends beyond their usual 2-hour visits, we can suggest with some confidence that when the parent surrogates are present, their effectiveness is similar to that of parents. We believe that even if our study has failed to offer strong support for the efficacy of interventions of the foster grandparent type in acute care settings, it fills a gap in the evaluation literature. Further, we hypothesize that in no evaluation will a 2-hour visiting program be found to significantly affect children's behavior in acute care hospitals until either (a) the program's effects are measured only while the friendly visitor is with the child—and the visitor should be present at moments of the child's highest probable anxiety—or until (b) the evaluation is based on much finer dimensions of behavior than have been typically used in observational studies. However, the finer the dimensions, the more difficult it will be to define and reliably observe them.

We believe our study raises an important question for policy makers. If program evaluation is to go beyond the anecdotal stage—and there is no question that had we depended on anecdotes for evaluation, our report, like so many others, would have been entirely positive—then we must be prepared to change our programs as the results of evaluation dictate. The contrast between our results and Branstetter's indicates that the observable carryover effects of parenting and substitute parenting beyond the hours when the parent or substitute parent is present is very limited. Our results suggest that such adult-child contact either should be constant, or lacking that, should be maintained during the periods and procedures most likely to be traumatic for the child. To the best of our knowledge, no hospital in the United States or Canada, and only one in England, attempts to provide all-day mother substitutes, and 10 years have passed since Branstetter's report. On the other hand, the 2-hour Foster Grandparent Program, though apparently only minimally effective in altering children's behavior in acute care settings throughout their entire waking hours, is widely implemented. Perhaps studies are needed of the effectiveness of these programs as supports during traumatic periods in a child's hospitalization, such as admission, painful procedures, and anesthesia induction and recovery. These are the very times when hospital personnel most commonly separate parents and parent surrogates from children.

Based on our work, the work of Branstetter, and the

many anecdotal reports on Foster Grandparent Programs—and pending further findings from future studies of similar interventions—we hypothesize that if the visiting of foster grandparents were altered to cover particularly traumatic times in children's hospitalization, that is, if it (a) began immediately upon the child's admission to the hospital, (b) was expanded beyond its usual current 2-hour duration, and (c) was activated during all traumatic medical procedures, we might then derive maximum benefits from the program at little additional cost. Parenthetically, the same recommendations appear to apply to the rules governing the visits of parents to their hospitalized children.

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SYNOPSIS

ZIEGLER, SUZANNE (University of Toronto), and KING, JOHANNA: *Evaluating the observable effects of foster grandparents on hospitalized children. Public Health Reports, Vol. 97, November-December 1982, pp. 550-557.*

Because Foster Grandparent Programs have been widely implemented in acute care settings but not systematically evaluated, a study was done of the effects that the visiting of parent surrogates had on young children in acute care settings. Three

groups of children in such settings were compared: those with foster grandparents, those without visitors, and those visited by their parents. Intergroup differences in the children's hospital behavior reached statistical significance in respect to only one of five behavioral domains investigated. The results of the foster grandparent intervention were found to be relatively weak compared with the results reported in earlier studies. However, it was believed that the discrepancy could be accounted

for by the presence or absence of the visitor at the time of observation of the child's behavior.

Implications drawn from the study were that greater benefits might be derived from the Foster Grandparent Program at little additional cost if the foster grandparent began visiting immediately upon the child's admission to the hospital, if this visiting extended beyond the current standard 2-hour period, and if the visitor was present at all traumatic medical procedures.

Employment Changes Among Patients Following Coronary Bypass Surgery: Social, Medical, and Psychological Correlates

STEPHEN J. ZYZANSKI, PhD
BEATRICE A. ROUSE, PhD
BABETTE A. STANTON, PhD
C. DAVID JENKINS, PhD

DURING THE PAST DECADE the number of coronary artery bypass operations performed in the United States has been increasing dramatically. It is estimated that more than 100,000 procedures are now performed annually at an approximate cost in the mid-1970s of \$10,000-\$12,000 per procedure (1,2). This cost increases to an estimated average of \$20,000 for patients with unstable angina (3). The cost of the surgery is but one important economic consideration. Another is whether the patient resumes gainful employment following surgery. Among patients in their economically active years, return to work is a particularly important index of the recovery process.

Reports in *Lancet* in 1976 claimed that bypass surgery is capable of improving the "quality of life" of angina patients (4,5). Several studies have reported that 70 to 80 percent of such patients experience significant improvement in angina symptoms in the early years following surgery (6,7). Thus, the data suggest

that a majority of patients could be expected to return to work following surgery. In the studies we reviewed, the percentage of patients returning to work ranged from 90 to 50 percent (8-18). Therefore, further investigation is needed concerning the factors that influence return to work and the quality of the postoperative work experience. In the study we report, we sought to evaluate the effects of surgery on the work status of 496 coronary artery bypass patients. Changes in employment status, the work environment, and the patient's perception of these changes were examined with respect to social, medical, and psychological factors.

Most studies reported in the literature focused on the male bypass patient. The large number of men undergoing this surgery annually makes this emphasis understandable. Although the procedure is becoming more common among women, there is a paucity of data on the female bypass patient. Therefore, our comparisons of men and women provide an opportunity to further knowledge concerning the factors that contribute to an important aspect of the recovery process, namely, return to gainful employment among patients undergoing this surgical treatment.

Return to work may be partly a factor of the worker's choice, but it is also affected by the willingness of the employer to rehire a person with a history of severe coronary disease. In fact, 15 percent of the survey respondents in this study reported encountering job discrimination as a function of their heart surgery. It has often been alleged that forcing a person to retire under-

Dr. Zyzanski is associate professor of family medicine, Department of Family Medicine, Case Western Reserve University School of Medicine, 2119 Abington Road, Cleveland, Ohio 44106. Dr. Rouse is with the Alcohol, Drug Abuse, and Mental Health Administration, Public Health Service, Rockville, Md. Dr. Stanton is with the Department of Behavioral Epidemiology, Boston University School of Medicine. Dr. Jenkins is with the Division of Preventive Medicine, University of Texas Medical Branch, Galveston.

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Tearsheet requests to Dr. Zyzanski.

mines his or her morale and raises the risk of both psychological and physical health problems. This issue is difficult to study because of the problem of discerning whether psychological and physical health status led to retirement or whether retirement led to poorer health. Because of its importance, however, the impact of forced retirement on persons below the mandatory retirement age was also assessed.

In summary, the objectives of this study were to answer the following questions. First, what is the profile of the bypass patient who typically returns to work postoperatively, and do the profiles for men and women differ? In addition to extent of disease, what difficulties are characteristic of those not returning to work? Last, what effect does forced retirement have on the heart patient's postsurgery adjustment?

Methods

Sample characteristics. A 25 percent random sample was drawn from former surgery patients listed on the membership rolls of each chapter of Mended Hearts, Inc., a self-help group of heart surgery patients with chapters located throughout the United States. Each selectee was mailed a precoded 8-page questionnaire and a form to indicate consent for participation. Of the 1,400 questionnaires mailed, more than 1,100 were returned for a response rate of 81 percent. The high rate of return suggests that the respondents were likely to be representative of the total group membership. Although chapter patients from all sections of the na-

tion were represented, we have no information on how representative this sample is of all U.S. heart surgery patients, inasmuch as this surgical population has not been adequately described.

Overall, 76 percent of the respondents (724) had bypass surgery. The 24 percent who had valve surgery or surgery to repair congenital anomalies were excluded from this report, as were those having rare or minor procedures. There were six times as many men as women in the bypass group. The average coronary bypass respondent underwent surgery at age 54.

Given the heterogeneous nature of the sample and a desire to make direct comparisons with other published studies, the sample for this report was restricted to white patients between the ages of 40 and 60 years who had their first coronary artery bypass surgery within the past 5 years. The upper age limit was set in order to allow an adequate interval for returning to work which would not overlap with usual retirement ages. The selection of white persons had minimal influence because less than 1 percent of the sample were members of other racial groups. Limiting the sample to initial surgery was necessary to control for prior recovery experiences. Finally, the distribution of the number of years since surgery in this sample ranged from 1 to more than 15 years. Thus, only patients who had the surgery within the past 5 years were retained so as to control better for accuracy of recall and changes in the surgical procedures over time. When all inclusion criteria were

Table 1. Sociodemographic and job-related characteristics of patients, by work status before surgery and sex

Characteristics	Men's work status (percentages)				Women's work status (percentages) ¹		
	Not working (N = 31)	Full time (N = 340)	Part time (N = 9)	Self employed (N = 46)	Not working (N = 29)	Full time (N = 35)	Part time (N = 5)
Family income of \$20,000 or more ²	23	39	22	50	31	29	40
College graduate ³	13	24	22	15	7	20	20
Type A score (mean)	3.5	1.2	-3.1	2.6	-5	0.8	6.6
Symptom duration (median years) ^{3,4}	4.0	1.1	3.0	2.5	1.2	1.0	.7
Mean years since surgery	3.1	3.1	4.0	2.6	2.6	2.9	2.2
3 vessels bypassed	48	44	33	52	24	31	0
Job before surgery:							
Heavy exertion	...	16	11	26	...	14	20
Professional level ⁴	...	44	44	57	...	37	0
Mean hours worked per week ^{4,5}	...	45	32	55	...	38.1	26.2

¹ 1 woman was self-employed.² Differences between male workers and nonworkers $P \leq .05$.³ Differences between female workers and nonworkers $P \leq .05$.⁴ Differences between full-time and self-employed men $P \leq .05$.⁵ Differences between women employed full time and part time $P \leq .05$.

employed, the sample available for study was reduced to 496 persons, including 70 women.

Questionnaire content. The questionnaire contained a broad array of precoded items covering demographic and social background, life circumstances before surgery, the surgical experience, emotional and social adjustment in the first year after surgery, and appraisals of current physical and emotional health, social relationships, and economic factors (19). Occupational level before and after surgery was also investigated. The coronary-prone or type A behavior pattern was estimated by a brief ad hoc scale (20).

Some questions probed changes in the work environment before and after surgery and the patient's reactions to them. A broad spectrum of issues was addressed including preparation for return to work, changes in work status, changes in the work environment, relationships with co-workers and employers, job title, physical exertion, job pressures, satisfaction, and responsibility as well as the timing of return to work and the number of hours worked per week before and after surgery.

Results

Work status before surgery. Since those working just before surgery are most likely to be employed again afterward, the impact of preoperative employment was the first issue to be examined. As expected for this age cohort, more men (92 percent) than women (59 percent) were employed preoperatively.

In table 1, selected characteristics are presented by work status before surgery. The major differences between preoperative employed and nonemployed men

were that income levels were lower and the presurgical symptom duration longer for the nonemployed. Level of education, type A behavior, and years since surgery were not significantly different between the combined employed groups and those not working. Among the patients working before surgery, the self-employed men were more likely than the "employees" to be in professional occupations, have higher family incomes, and work longer hours. Men employed full time had the shortest average duration of preoperative symptoms of all employed categories.

Because of the few women patients in the sample, many relationships are only suggestive rather than being statistically significant. Working women were better educated than those not working before surgery (table 1). Working women were as likely as men to report that their job before surgery involved heavy physical exertion. Compared to men, women tended to work fewer

Table 2. Employment rates among total sample at time of surgery and rate of return to work among the employed, by sex

Type of bypass	Total sample		Employed at surgery		
	Number	Percent employed at surgery	Number	Percent returning to work	Average months to return
Men					
1-vessel	58	91	53	79	3.8
2-vessel	176	94	165	82	3.9
3-vessel	192	92	177	81	3.5
Women					
1-vessel	19	58	11	46	4.4
2-vessel	33	58	19	53	5.2
3-vessel	18	61	11	82	4.6

Table 3. Preoperatively employed patients who returned to work, by sex and preoperative sociodemographic characteristics

Preoperative characteristic	Men (N = 395)		Women (N = 41)	
	Number	Percent	Number	Percent
Family income:				
\$20,000 or more	158	188	12	67
Less than \$20,000	220	180	29	55
Education:				
College graduate	90	87	9	56
Less than college graduate	304	82	32	59
Job-related physical exertion:				
Heavy	67	166	6	33
Not heavy	321	187	33	67
Job level:				
Professional	177	189	14	57
Nonprofessional	209	179	25	64
Employment:				
Full time	339	83	35	63
Part time	9	89	5	40
Self-employed	46	85	1	0

¹ Percentages returning to work within each subgroup differ at $P < .05$ (by chi-square) across levels of the demographic characteristic.

NOTE: some sections of the table have slightly lower total sample sizes due to nonresponse.

hours per week, a smaller proportion were college graduates, and the women had undergone their heart surgery more recently.

The relationship between employment status at surgery and the number of vessels bypassed is shown in table 2. This measure of extent of disease showed no relationship to prior working status, but women generally had fewer vessels bypassed than men (table 1).

The return to work rate for preoperatively employed persons was high for males (81 percent) and much

Table 4. Postsurgery medical conditions among preoperatively employed patients, by sex and return to work status, in percentages

Postsurgery condition	Men		Women ¹	
	Returned (N = 326)	Did not return (N = 67)	Returned (N = 24)	Did not return (N = 17)
Heart-related hospitalization	8	12	21	24
Any hospitalization	44	51	63	59
Bedridden 3 or more days in past month ²	3	10	13	18
Severe, recurring chest pain or dyspnea in past month	2	8	8	12
Number of medication types currently taken ²	1.6	2.1	2.3	2.6

¹ Small sample sizes for these groups seriously reduce the power to detect significant differences.

² Differences between returnees and nonreturnees $P \leq .05$.

lower for females (58 percent). Return rates were uniformly high for males with 1-, 2-, or 3-vessel disease (table 2). For women with 1- and 2-vessel bypasses, the proportion returning to work was substantially lower than for women with triple bypasses and for men of all three categories. Males also tended to return to work an average of 3.6 months after surgery; females took an average of 1 month longer to return.

Returnees versus nonreturnees. The remainder of this analysis concentrates on that group with the greatest probability of postoperative employment—the 395 men and 41 women who were employed preoperatively. Table 3 shows characteristics of this group associated with return to work following surgery. Men likely to return had higher family incomes and held professional

Table 5. Preoperative characteristics of patients employed before surgery by postoperative retirement status, in percentages

Characteristics	Men currently working (N = 292)	Retired men			Women currently working (N = 12)	Retired women		
		Forced (N = 81)	Voluntary (N = 32)	P value		Forced (N = 17)	Voluntary (N = 12)	P value
Sociodemographic:								
Family income of \$20,000 or more ¹	44	37	16	.01	42	12	42	.12
College graduate ¹	25	21	9	.12	25	24	17	.86
Type A score ²	.9	2.1	1.6	.65	-2.4	5.1	.6	.05
Preoperative job-related:								
Heavy physical exertion ¹	12	30	25	.001	8	18	17	.76
Professional level ¹	50	35	28	.01	42	18	50	.15
Mean hours worked per week ²	46	46	45	.77	40	34	38	.32
Medical:								
3 vessels bypassed ¹	45	46	41	.98	33	24	25	.66
Symptom duration (median years) ²	2.9	4.1	3.2	.13	3.1	2.2	4.1	.67

¹ Probability determined by chi-square (df = 2).

² Probability determined by 1-way analysis of variance.

Table 6. Postsurgery conditions among preoperatively employed patients, by sex and postoperative retirement status, in percentages

Postsurgery condition	Men				Women			
	Retired			P value	Retired			P value
	Currently working (N = 282)	Forced (N = 81)	Voluntary (N = 32)		Currently working (N = 12)	Forced (N = 17)	Voluntary (N = 12)	
Heart-related hospitalization ¹	17	42	25	.001	8	47	33	.09
Any hospitalization ¹	41	63	47	.001	42	77	58	.16
Bedridden 3 days or more in past month ¹	8	19	16	.01	16	35	8	.20
Severe, recurring pain ¹	2	6	6	.07	0	6	25	.09
Other continuing health problem ¹	30	41	48	.03	16	37	50	.09
Number of medication types ²	1.4	2.4	2.2	.001	2.1	2.9	2.3	.40
Physician's preparation for return to work inadequate ¹	3	10	14	.03	8	33	16	.03

¹ Probability determined by chi-square (df = 2).

² Probability determined by 1-way analysis of variance.

jobs requiring little physical exertion. For the smaller number of women, none of these variables were associated with statistically reliable differences. Level of education was not statistically associated with return to work for either sex. Return to work rates were comparable for men employed full time, part time or self-employed. For women, this comparison cannot be safely made because of small sample sizes. Unfortunately, no data were available on the working status of the patient's spouses. In this age group, however, a small percentage of the wives and a large percentage of the husbands could be expected to be employed. This discrepancy could account for some of the sex differences among those returning to work.

Postoperative medical problems in persons returning and not returning to work are presented in table 4. Two statistically significant differences were noted for men. First, more of the men not returning to work required bed rest for more than 3 days in the past month; nevertheless, only 10 percent of the nonworkers, as compared with the returnees, were so affected. Second, the nonreturnees also had been prescribed more types of medication. The same trends appeared for women, but

they were not statistically significant. Other variables examined showed similar trends, that is, a tendency toward more hospitalizations, especially heart related ones, and more frequently recurring chest pains or dyspnea during the past month. Yet, except for all hospitalizations, these markers of ill health were experienced by only a small minority of the respondents, and they make only a small contribution to explaining failure to return to work. Alleviation of angina, for example, was gratifyingly high in this sample with 90 percent of men and 79 percent of women reporting total or partial relief of angina and dyspnea postoperatively. Still, women manifested far more of all these markers of ill health than did men, irrespective of employment status.

Retirement status. In this retrospective study, retirement status was identified as follows: (a) forced to retire, (b) voluntarily retired, and (c) currently working. All persons were younger than the traditional retirement age of 65 years.

Selected comparisons are summarized in table 5. Men currently working differed from those who retired

Table 7. Preoperatively employed patients who reported worsened feelings after surgery, by sex and postoperative retirement status, in percentages

Changed for worse regarding—	Men				Women			
	Retired			P value	Retired			P value
	Currently working (N = 282)	Forced (N = 81)	Voluntary (N = 32)		Currently working (N = 12)	Forced (N = 17)	Voluntary (N = 12)	
Pleasure in life	11	26	31	.01	17	29	8	.35
Worry	20	32	34	.02	42	41	42	.99
Depression	20	35	38	.01	42	59	33	.37
Ease of adjustment to changes	19	35	28	.01	8	47	25	.08

voluntarily in what has now become a familiar profile. They represent the upper socioeconomic status as reflected in the higher income, education, and occupation levels and jobs requiring little physical exertion. They did not differ in terms of type A behavior or in the number of hours worked per week. Again, the benefits and advantages of being able to work longer following surgery are more likely to be enjoyed by the upper socioeconomic level worker. In income and education, those forced to retire more closely resembled those currently working than those who retired voluntarily. They differed in terms of holding jobs which required more physical exertion, and they were less likely to have a professional level job than those who continued to work. All groups tended to report substantial amounts of overtime work.

Characteristics associated with retirement for females are also shown in table 5. Like their male counterparts, female patients showed the same upper socioeconomic status pattern but, with the reduced sample, only one trend is significant. It shows that women forced to retire were more likely to exhibit type A behavior. A similar but nonsignificant trend was observed for men. Unlike the men, women retiring voluntarily were as likely to be professionals as those who continued to work. Moreover, men forced to retire tended to have a long period of experiencing symptoms before surgery compared with men who retired voluntarily, but the opposite trend was the case for women.

The associations observed between postsurgical medical conditions and retirement status for men and women are presented in table 6. For all outcomes examined, those currently working experienced the least morbidity. Those who reported that they had been forced to retire, however, form the extremes in four of the seven comparisons shown. Thus, as far as medical problems related to the heart surgery are concerned, those forced to retire represent a group with a higher percentage of morbidity, both for men and for women.

To complete this profile, the data presented in table 7 illustrate, for the same three groups, the associations found between postoperative emotional adjustment and retirement status. It is important to note that the prevalence rates we report are for the study month in comparison to the way the patient felt before surgery. Subjects were asked to respond, on a 5-point scale, ranging from much worse through no change to much better, how they felt nowadays (that is, this month) in comparison to the way they felt 1 year before their surgery. The results in table 7 are only for those reporting they felt worse or much worse. Men who were forced to retire, or who retired voluntarily, uniformly reported high rates of negative emotional adjustment problems

compared with those currently working. The pattern is less consistent for the few voluntarily retired women, but the women forced to retire tended to have the worst reported emotional adjustment on 3 of the 4 indices (but the difference was not statistically significant because of the small sample).

Discussion

In this study we attempted to document the relation of postoperative employment status to economic, social, and psychological statuses of persons who had coronary bypass surgery in the previous 5 years. This sample is adequately representative only of the nationwide organization of former heart surgery patients; how well it represents all persons in the United States who have had major heart surgery cannot be demonstrated because the characteristics of that larger population are not known. The data reported by our respondents, in general, did not differ greatly from what our experienced clinical consultants believe to be characteristics of bypass surgery patients. Nevertheless, caution in interpretation is warranted because these data are derived from patients' self-reports of states of health in a retrospective study.

The socioeconomic data suggest that, compared to the general U.S. population in this age range, the membership of Mended Hearts, Inc., has higher levels of education and higher presurgical occupational status. If major heart surgery is more readily available to middle- and upper middle-class persons, it is possible that the population of U.S. heart surgery patients may differ from the general population in the same direction. A recent study conducted in Buffalo, N.Y., provides some evidence that people in lower occupational and economic levels are less likely to have bypass surgery (21).

In our sample, rate of return to work is highest for professionals perhaps because they have the most authority and flexibility over their own work situations. Nevertheless, the return to work rates do not drop below 80 percent until one reaches blue-collar levels.

Most respondents came from cohorts of patients whose surgery had been performed since 1973, and hence loss from the sample due to deaths following surgery seems acceptably low. In terms of the influence that the course of recovery has on entry into Mended Hearts, Inc., the opinion of the organization's leaders is that persons with a poor initial course of recovery are less likely to join the organization. Also, persons who quickly establish their normal routine and social activities often feel that they have no further need for a patient organization and drop out of membership. Thus, it appears that the membership lists represent a distribution of recovery outcomes truncated at the extremes, and per-

haps, the mean level of recovery of the current membership may not differ seriously from the true but unknown mean of the total population.

In most recent studies concerning the effects of this surgery on postsurgical employment, return to work rates range widely from 90 to 50 percent. For example, in one study, patients experienced no noticeable increase in work activities postoperatively; for example, there was no net improvement in hours worked after surgery among 350 bypass patients (8). The authors also reported no statistically significant relationships between return to work rates and the factors of age, sex, marital status, and occupation. The findings with respect to occupation and sex are in direct contrast to those reported in this study.

On the other hand, in a study involving 893 men, the investigators report that 90 percent of those under 55 years and 75 percent of those over 55 returned to work an average of 14 months after surgery (9). The overall return to work rate was 83 percent. This high level of re-employment is similar to that reported for survivors of myocardial infarction (22). Similar rates of return to work were reported in a third study of 564 male bypass patients (10). The researchers found that 90 percent of the men under 55 years, 68 percent of those 55-59, and 44 percent of those 60 years or older at surgery were employed 4 years after surgery. Of patients not employed before surgery, 22 percent were found to be employed 4 years later. In a fourth study, the investigators monitored 329 survivors of bypass surgery an average of 2 years postoperatively and found that 81 percent of those under 55 years and 75 percent of those over 55 years old returned to work (11). The overall return rate was 79 percent. Symmes and co-workers also reported that 11 percent of the patients who were unemployed at the time of surgery returned to work following surgery. Finally, in two other studies, somewhat different results were reported. Among patients working at the time of surgery, David and co-workers observed that only 62 percent returned to work (12), and the proportion reported by Frick and co-workers was 60 percent (13).

Thus, the high preoperative employment rate and the high postoperative return to work rate for men in our study replicates rates reported by several other investigators who used large clinical samples. The relatively quick average of 3.6 months to return to work is also a significant indicator of the success of this type of surgery. In men, the short average recuperative period and the high percentage of patients returning to work speaks well for this aspect of the recovery process. The much lower preoperative work rate and the smaller return to work rate for women is noteworthy, as is the

longer average recuperative interval. These observations deserve further exploration for the underlying reasons, and perhaps the vocational rehabilitation services offered to women should be upgraded.

Return to work following surgery was most clearly related to socioeconomic level for both sexes in this study. In addition to the differences in physical exertion and monetary rewards, the motivation to return to work may also differ systematically among different occupational groups. It is known that work satisfaction tends to follow the same declining profile across occupational status classifications.

Another correlate of return to work was the patient's postoperative physical health. Those men who experienced more morbidity postoperatively were significantly less likely to have ever returned to work. This observation is in agreement with several studies which indicate a strong association between postoperative angina and resumption of employment (10-12). A related characteristic to emerge from these comparisons is the observation that, on the average, men who were unemployed at the time of surgery experienced symptoms for nearly 5 years before surgery. Thus, examining return to work rates among those working full time before surgery is possibly biased in favor of those in better health at surgery. Furthermore, some persons do not return to work after surgery even though they are markedly improved in terms of symptoms and functional capacity. Logue and co-workers, in particular, noted that only 50 percent of patients returned to work, although 90 percent experienced symptomatic improvement and relief of angina (18). Physiological improvement is sufficient to bring some patients back to work, but many others need added motivation. Unfortunately, no data were collected concerning the patient's health insurance or retirement benefits. These benefits are often so financially generous that they tend to make returning to work a less attractive option.

An important new observation involves patients who were forced to retire. Men (but not women) forced to retire were more likely to have higher socioeconomic status than those who retired voluntarily. Women (but not men) forced to retire were more likely to experience greater postoperative morbidity and poorer emotional adjustment and to report, as a group, that their physicians had least adequately prepared them for return to work. Thus, potentially they face a more difficult adjustment following forced retirement, as the continuing and chronic nature of these adjustment problems seems to indicate. They are a particularly vulnerable group of patients who would seem to require additional postoperative support and counseling. Further research is needed to clarify and replicate these potential high-risk

groups and to plan for more appropriate clinical and psychological management following surgery.

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SYNOPSIS

ZYZANSKI, STEPHEN J. (Case Western Reserve University School of Medicine), ROUSE, BEATRICE A., STANTON, BABETTE A., and JENKINS, C. DAVID: *Employment changes among patients following coronary bypass surgery: social, medical, and psychological correlates.* *Public Health Reports*, Vol. 97, November-December 1982, pp. 559-565.

The relations of socioeconomic and psychological factors to resumption of employment following coronary artery bypass surgery were studied using a questionnaire returned by a sample of 426 men and

70 women. The sample was drawn from the membership of Mended Hearts, Inc., a nationwide voluntary organization of persons who have had heart surgery.

Preoperatively, more men (92 percent) than women (59 percent) were employed. Return to work rates were high for men (81 percent) and much lower for women (58 percent). The 395 men tended to return to work an average of 3.7 months after surgery whereas the 41 women took an average of 4.8 months. Return to work following surgery was most clearly related to socioeconomic level for both sexes. In addition, for men, those most likely to return had less

postoperative morbidity and held jobs requiring little physical exertion.

Patients who reported that they were forced into an early retirement represent a particularly vulnerable group in that they were more likely to experience the most postoperative morbidity. As a group, they believed that their physicians had least prepared them to return to work, and they experienced the poorest emotional adjustment. Thus, women and those forced into early retirement represent two potentially high-risk groups of patients who would seem to require additional clinical and psychological management following surgery.

Evaluation of the Use of Rural Health Clinics: Attitudes and Behaviors of Primary Care Physicians in Service Areas of Nurse Practitioner Clinics

THOMAS R. SHARPE, PhD
BENJAMIN F. BANAHAN, III, PhD

THE MAJOR OBJECTIVE of the nurse practitioner (NP) role has been to increase the productivity of all levels of medical manpower by assigning functions to the least skilled and lowest paid health professional capable of performing the particular task. It is generally acknowledged that all of the functions currently performed by the physician do not require the high level of skills which the physician possesses (1). Many of these functions may be effectively delegated to nurse practitioners, thus allowing the physician more time to perform more complicated functions requiring advanced skills.

Dr. Sharpe is associate director, Research Institute of Pharmaceutical Sciences, University of Mississippi School of Pharmacy, University, Miss. 38677. Dr. Banahan is assistant professor, Department of Community Medicine, School of Primary Medical Care, University of Alabama in Huntsville.

The study was supported by a contract from the Mississippi Medicaid Commission Rural Health Clinics Project (Public Health Service-Health for the Underserved Rural Areas grant No. 04-D-00135) and in part by the Division of Health Services Research, Research Institute of Pharmaceutical Sciences, University of Mississippi.

Reprints requests to Dr. Sharpe.

Whether nurse practitioners have been able to practice successfully in a given geographic area or professional realm has generally depended on questions concerning productivity, quality of care, and patient and physician acceptance. Most of the early research regarding nurse practitioners examined questions concerning productivity and quality of care. Results of these studies indicate that NPs can assume roles that increase physician productivity without any dilution of service quality (2,3).

Several other studies have examined patients' acceptance of nurse practitioners. These have indicated that the general population appears to be very willing to allow a trained NP or physician assistant to care for them or their families (4,5).

Patients who have received health services from nurse practitioners have reported high levels of satisfaction (6). This finding concerning high levels of satisfaction with nurse practitioner services is corroborated by results detailed in the first paper in our two-part report "Evaluation of the Use of Rural

Health Clinics: Knowledge, Attitudes and Behaviors of Consumers" (7). Among the seven satisfaction measures investigated, users of services at nurse practitioner clinics were as satisfied or significantly more satisfied than their counterparts who received primary care services from a local physician.

Attitudes and behaviors of other providers in the vicinity of a rural health clinic are important to its success, because these providers may influence the patients who may or may not become clinic users. These factors are especially true of satellite NP clinics. Since the nurse practitioner must sometimes refer patients to local primary care physicians, the NP must have a good working relationship not only with the clinic backup physician, but also with other primary care physicians in the area. Furthermore, patients who use such a clinic must believe that the NP and the physician of their choice work closely in the same health care system. The objectives of this study, therefore, were to (a) identify attitudes and behaviors of other medical providers which may be related to clinic use and (b)

based on findings from objective *a*, to recommend policies and actions aimed at increasing clinic use.

Methodology

Description of study clinics. Four rural health clinics were examined in this evaluation. They were selected to represent different geographic areas within the State of Mississippi as well as different utilization rates. All four clinics had been providing services for at least 9 months when the data collection began. Three clinics were funded through the Rural Health Initiative (RHI) program and the fourth clinic was a freestanding National Health Service Corps site.

To protect the confidentiality of the clinics and the other medical providers who participated, the clinics are designated as A, B, C, and D. These designations were assigned to the clinics according to their average daily utilization rates (table 1); clinic A had the highest rate and clinic D had the lowest.

Data collection. The attitudes and behaviors of the primary care providers who practice in the clinic

service areas were ascertained via a brief questionnaire. These providers were identified by the project directors of the four clinics.

Items in the questionnaire pertained to the following topics:

1. attitudes and knowledge concerning nurse practitioners,
2. attitudes toward and awareness of the RHI clinic,
3. experience with the clinic,
4. opinions concerning good and bad attributes of the clinic, and
5. attitudes toward working cooperatively with the clinic.

The directors provided names and addresses of 41 local primary care physicians who practiced in the clinics' service areas. The questionnaire, along with a cover letter explaining the purpose of the survey, was mailed to each physician. The physician was requested to complete the questionnaire and return it in a postage-paid reply envelope. A second letter and questionnaire were mailed to all physicians who did not respond to the first mailing within 1 month. After both mailings 25 physicians (61.0 percent) responded.

Results

Table 2 depicts physicians' previous experience and knowledge concerning nurse practitioners. Among respondents, 9 (36.0 percent) indicated they had worked with a nurse practitioner; 6 had worked with NPs in their own practice, and the same number indicated that it had been in another setting. Three physicians reported that they currently employed an NP.

Asked whether they had ever heard or read anything about nurse practitioners, 21 reported "yes." Most frequent sources of information included the lay press, television or radio (52.4 percent); non-subscription professional journals (47.6 percent); presentations at professional meetings (42.9 percent); professional subscription journals (38.1 percent); and a professional colleague who has not worked with a nurse practitioner. Most physicians reported more than one source of information.

Finally, the physicians were asked if they would be interested in learning more about nurse practitioners. Almost three-quarters of the physicians responded "no." However, a

substantial portion (36.0 percent) had worked with nurse practitioners at the time of the survey or in the past. Anecdotal information indicated that others were not interested because they were strongly against the nurse practitioner concept or because they felt they already knew enough about NPs to satisfy their needs.

Table 3 summarizes data concerning physicians' attitudes toward the nurse practitioner concept, specifically whether they would hire an NP in their own practices. Of the 24 physicians responding, 5 indicated a desire to employ a nurse practitioner; an additional 10 approved of the concept but did not want to employ one. Eight physicians indicated they did not approve of the nurse practitioner concept, and one reported he did not know enough about the concept to decide. These results were similar to an earlier statewide survey of 475 Mississippi physicians conducted in 1979 by the Research Institute of Pharmaceutical Sciences, University of Mississippi (8); responses in the present study did not differ significantly ($X^2 = 2.01$, $df = 3$) from the statewide survey response.

Among physicians who approved of the concept, reasons for not wanting to hire a nurse practitioner included do not need one in my practice (66.7 percent), prohibitive costs (16.7 percent), and difficult for a nurse practitioner to join an old established practice (16.7 percent). Physicians who did not approve of the nurse practitioner concept cited three reasons: nurses practicing medicine (66.7 percent), nurse practitioner is not qualified to provide primary care (16.7 percent), and no quality assurance (16.7 percent), as shown in table 3.

Table 4 summarizes physicians' reports regarding interaction with the rural health clinic (and its

Table 1. Characteristics of four rural health clinics

Characteristic	Clinic A	Clinic B	Clinic C	Clinic D
Population of community (1970 census data)	450	275	1,125	600
Estimated target population (data supplied by clinic)	(¹)	5,329	2,041	5,106
Estimated target population calculated by Research Institute of Pharmaceutical Sciences	7,857	5,478	4,017	3,637
Average daily utilization rate	16.3	8.9	3.9	2.9

¹ Clinic did not have the information.

nurse practitioner) in the area. Among physician-respondents, 52 percent reported that someone from the clinic had visited or talked with them about the clinic. More than three-fourths of the physicians indicated that they had never visited the clinic, although 60 percent of this group indicated they would like to do so at a convenient time.

Referral and consulting patterns are also presented in table 4. Among the 25 physicians who responded, 12 physicians had patients referred to them by the clinic, and 7 of these physicians were satisfied with the information that they had received on each patient.

Among the 25 physicians who responded, 12 indicated that they had received one or more calls from the nurse practitioner clinic to consult about one of the physician's patients. The physicians were satisfied with the outcome of the consultation in each instance that was reported.

Thus, table 4 sums up several important statistics concerning nurse practitioner clinic—local physician interaction. Only about half of the physicians reported that they had ever been contacted by a clinic staff member. Only about a quarter of the physicians had actually visited the clinic, although 60 per-

Table 2. Physicians' previous experience with and knowledge of nurse practitioners

Question	Yes		No	
	Number	Percent	Number	Percent
Have you ever worked with a nurse practitioner?	9	36.0	16	64.0
If yes—				
Was this in another practice setting?	6	66.7	...	...
Was this your own practice?	6	66.7	...	...
Do you currently employ a nurse practitioner in your practice setting?	3	33.3	...	...
Have you ever read or heard anything about nurse practitioners?	21	87.5	3	12.5
Source, if yes—				
Lay press, TV, or radio?	11	52.4	...	...
Nonsubscription professional journals?	10	47.6	...	...
Professional subscription journals?	8	38.1	...	...
Professional colleague who has worked with a nurse practitioner?	9	42.9	...	...
Professional colleague who has not worked with a nurse practitioner?	7	33.3	...	...
Some other source?	3	14.3	...	...
Presentation at a professional meeting?	9	42.9	...	...
Would you be interested in learning more about nurse practitioners?	6	26.1	17	73.9

Table 3. Physicians' responses to "Which statement best describes your desire to employ a nurse practitioner in your own practice?"

Response	Number	Percent
Yes, I would like to hire a nurse practitioner	5	20.8
No, while I approve of the concept, I would not like to employ one in my practice because	10	41.7
Do not need one in my practice	4	16.7
Prohibitive costs	1	4.2
Difficult for a nurse practitioner to join an old established practice	1	4.2
No response	4	16.7
No, I do not approve of the concept of nurse practitioner because	8	33.3
Nurses practicing medicine	4	16.7
Nurse practitioner is not qualified to provide primary care	1	4.2
No quality assurance	1	4.2
No response	2	8.3
I do not know enough about the nurse practitioner concept to decide	1	4.2
No response	1	4.2

Table 4. Physicians' interactions with the local rural health clinic

Question	Yes		No	
	Number	Percent	Number	Percent
Has anyone at _____ clinic ever visited or talked with you about this clinic?	13	52.0	12	48.0
Have you ever visited _____ clinic?	6	24.0	19	76.0
If no: Would you like to if it were convenient? ¹	6	40.0	9	60.0
Has a patient ever been referred to you from _____ clinic?	12	48.0	13	52.0
If yes: Were you satisfied with the information on the patient's condition that you received? ¹	7	77.8	2	22.2
Has the nurse practitioner at _____ clinic ever called you to consult about one of your patients?	8	32.0	17	68.0
If yes: Were you satisfied with the outcome of the consultation? ¹	6	100.0	0	0.0

¹ Total does not equal number of "Yes" or "No" respondents because of missing values.

Table 5. Physicians' attitudes toward patients using the local rural health clinic

Question	Yes		No	
	Number ¹	Percent	Number ¹	Percent
Have you ever encouraged a patient to use _____ clinic for routine care or followup?	7	28.0	18	72.0
If you had a patient who lived near _____ clinic, would you ever advise them to:				
Obtain followup care at the clinic after an acute illness episode?	8	36.4	14	63.6
Obtain followup care at the clinic for a stable chronic illness?	12	54.5	10	45.5
Obtain general care at the clinic and have clinic personnel consult with you or refer them to your office when necessary?	11	45.8	13	54.2

¹ Totals vary due to missing values.

cent of those who had not made such a visit indicated an interest in doing so. Referrals and consultations were somewhat low, but physicians reported that they were satisfied with the outcomes when the referrals and consultations did occur.

Table 5 depicts physicians' attitudes toward patients who used the local rural health clinic. Eighteen physicians indicated they had never encouraged a patient to use the local clinic for routine or followup care. When asked whether they would ever advise a patient who lived near the clinic to obtain clinic services, 8 reported they would recommend obtaining followup care for an acute illness episode, 12 would recommend followup care for a stable chronic illness, and 11 would recommend general care with consultation or referral to the physician when necessary.

Table 6 presents physicians' responses to questions which deal with perceived advantages and disadvantages of the local nurse practitioner clinic. Most frequently cited advantages were close to home, availability (46.2 percent); good source of primary care with referral when necessary (19.2 percent); none (19.2 percent); and blood pressure checks and followup care (11.5 percent).

Most frequently cited disadvantages included physician provides better care, personnel are not qualified or properly trained (18.5 percent); none (18.5 percent); physician is not present at the clinic enough, nurse practitioner uses own judgment too much (11.1 percent); and high fees, waste of tax dollars (11.1 percent). Overall, physicians saw a moderate need in the community for the local rural health clinic (table 7).

The physicians were asked what the local clinic staff could do to work more closely with them to

care for area residents (table 6). Suggestions in descending frequency of response were consult with other physicians in the area, do nothing, refer patients to their regular physician, hold regular meetings with area physicians, inform other providers of services offered, and provide more laboratory services. Overall, physicians responded that they were somewhat willing to work with the local rural health clinic when asked to rate their willingness on a 4-point scale (table 8).

Discussion

Physicians who practiced in the vicinity of the four rural health clinics studied generally approved of the nurse practitioner concept and expressed a willingness to work more closely with the clinics. However, a majority of these physicians reported that they had little, if any, contact with their local clinic. More importantly, previous contact with the local clinic was significantly related to the physicians' positive attitudes toward patients using the rural health clinic in the area.

This link between experience or knowledge and approval was verified in the earlier statewide study (8). Physicians in this 1975 survey who reported a "great deal" of previous experience responded with an approval rate of 86.1 percent, while physicians who reported no direct experience had an overall approval rate of only 62.9 percent. Similarly, 79.0 percent of physicians who reported knowing another physician who employed a nurse practitioner approved of the concept; only 62.5 percent of the remaining physicians approved.

The physicians who responded to the survey offered several specific comments regarding the clinics' advantages and disadvantages as well as methods to improve working relationships with the local clinic. The following specific rec-

Table 6. Physicians' comments about the local rural health clinic

Question	Number	Percent
What do you see as the main advantage, if any, to the public in having a rural health clinic such as _____ clinic?		
Close to home, availability	12	46.2
Good source of primary care with referral when necessary	5	19.2
Blood pressure checks and followup care	3	11.5
Emergency care until physician arrives	1	3.8
None	5	19.2
No response	2	...
What do you see as the main disadvantage, if any, to the public in having a rural health clinic such as _____ clinic?		
Physician provides better care, personnel are not qualified or properly trained	5	18.5
Physician is not present enough, nurse practitioner uses own judgment too much	3	11.1
High fees, waste of tax dollars	3	11.1
Nurse practitioner refers patients only to backup physician	2	7.4
Nurse practitioner prescribes too much	2	7.4
Public thinks nurse practitioner is a physician	2	7.4
Clinic not needed because physicians are available nearby	2	7.4
Pharmacy services are not available	1	3.7
Limited hours of coverage	1	3.7
Discourages physicians from locating in community	1	3.7
None	5	18.5
No response	3	...
What could the medical and administrative personnel at _____ clinic do to work more closely with you in providing care to the residents of the area?		
Consult with other physicians in the area	5	27.8
Refer patients to their regular physician	4	22.2
Hold regular meetings with physicians in the area	1	5.6
Provide more laboratory services	1	5.6
Inform other providers of services offered	1	5.6
Provide public health services	1	5.6
Nothing	5	27.8
No response	8	...

ommendations stem from their comments.

Provide information to the physicians in the area by (a) attending hospital medical staff meetings to discuss the role of the nurse practitioner and the clinic's services, (b) holding regular meetings with

area physicians, and (c) having clinic open houses for other medical providers. Develop linkages by initiating personal contact with providers in the area through individual protocols and consulting with the patient's usual physician and referring when necessary and by

Table 7. Physicians' ratings of need in the community for the local rural health clinic

Clinic	Sample size	Need rating (percent)					Mean
		Very strong need	Strong need	Moderate need	Little need	No need at all	
A	7	14.3	28.6	14.3	42.9	0	2.86
B	7	14.3	14.3	14.3	42.9	14.3	3.29
C	5	20.0	0	0	60.0	20.0	3.60
D	6	0	33.3	33.3	33.3	0	3.00
Overall	25	12.0	20.0	16.0	44.0	8.0	3.16

Table 8. Physicians' willingness to work with the local rural health clinic

Clinic	Sample size	Willingness rating (percent)				Mean
		Very willing	Somewhat willing	Slightly willing	Not at all willing	
A	7	42.9	14.3	28.6	14.3	2.14
B	7	42.9	28.6	0	28.6	2.14
C	5	40.0	0	0	60.0	2.80
D	6	50.0	16.7	33.3	0	1.83
Overall	25	44.0	16.0	16.0	24.0	2.20

consulting with area physicians regarding the development of services.

In summary, a more assertive role by nurse practitioners and clinic administrators in establishing working relationships with local primary care physicians should result in improved clinic use. This more assertive role should also foster a more integrated system of primary care delivery in rural communities.

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SYNOPSIS

SHARPE, THOMAS R. (Research Institute of Pharmaceutical Sciences, University of Mississippi), and BANAHAN, BENJAMIN F., III: *Evaluation of the use of rural health clinics: attitudes and behaviors of primary care physicians in service areas of nurse practitioner clinics. Public Health Reports, Vol. 97, November-December 1982, pp. 566-571.*

In response to concerns of the directors of Rural Health Initiative projects in Mississippi, a study was conducted to examine factors related to use of rural health clinics. This report focuses on attitudes and behaviors of primary care physicians in the service areas of four clinics staffed by nurse practitioners. Data for this evaluation were obtained via mail questionnaires sent to 41 pri-

mary care physicians in the service areas of the clinics. Usable responses were received from 25 (61.0 percent) of the physicians.

The data indicate that a majority of these physicians approve of the nurse practitioner concept. Although there is evidence to support a positive correlation between previous experience and knowledge concerning nurse practitioners and physician acceptance of the nurse practitioner concept, only about half of the physicians reported that anyone had ever contacted them to talk about the clinic. Only about a quarter of the physicians had ever visited the rural health clinic, but 60 percent indicated that they would like to do so.

These findings indicate a need to

develop closer working relationships with all primary care physicians in the service area of a rural health clinic. The data indicate that when such a closer relationship existed, physicians were satisfied with the outcome of interactions. Twelve (48 percent) physicians stated that they had patient(s) referred to them by the clinic. Among these physicians 77.8 percent were satisfied with the information that they had received on the patient's condition. Fewer physicians (8 or 32.0 percent) reported that they had received a call from the nurse practitioner clinic to consult about one of the physician's patients. The physicians were satisfied with the outcome of the consultation in each instance that was reported.

Attitudes of Mothers of Preschoolers Toward Government Regulation of Day Care

CHERYL S. ALEXANDER, PhD
RICKA KEENEY MARKOWITZ, ScD

EXTRAORDINARY INCREASES in the labor force participation rates of women, particularly of those with preschool children, occurred during the 1970s. In 1950, 13.6 percent of the women with children under age 6 were in the labor market. By 1980, the figure rose to 43 percent, almost triple that of 1950 (1). In the past decade, the proportion of one-parent families has grown substantially; the greatest increases have been among families with children under 6 years old (2). The labor force participation rates are higher for single-parent mothers than for mothers in two-parent families. In 1979, approximately 56 percent of the single-parent mothers and 43 percent of the mothers in two-parent families were employed or looking for employment (2). Thus, the evidence indicates that in the 1980s women will continue to enter the marketplace in ever-increasing numbers. Moreover, according to projections based on birth rates and trends of participation in the labor force by women, by 1990 an estimated 10.4 million children under age 6 will require some form of substitute care while their mothers work (3).

Historically, the Federal Government's role in day care has been limited almost exclusively to the develop-

ment and support of nonprofit centers. Some child care planners argue that all preschool children in substitute care, not only the economically disadvantaged, can profit from organized day care programs (4). Yet fewer than 4 percent of the preschool children in day care in 1975 were in centers (5). Although this figure is higher for preschool children of working mothers (10-15 percent), survey results consistently indicate that most families make child care arrangements in their own homes or in the homes of relatives, neighbors, or friends (6-9).

Family day care, or the care of a child in a private home other than his own, is the most prevalent mode of substitute child care for preschoolers and for school-age children with working parents (10). Informal, unregulated care by relatives, neighbors, or friends is likely to be replaced by more formal, licensed forms of family day care in light of the decline in numbers of multigenerational households and in the availability of mothers who choose to remain in the home rather than seek employment.

Studies of day care have identified costs, convenience, and availability factors associated with child care but have largely neglected parental attitudes (6-8). This neglect stems, in part, from limited questionnaire space allotted day care in most national surveys and from the emphasis researchers have placed on economic and demographic factors. Yet, it would be a mistake for child care planners to ignore consumer attitudes in setting day care policies. How do consumers view the government's role in day care? How receptive would parents who use care in their own home or out-of-

Dr. Alexander is associate professor and Dr. Keeney Markowitz is a postdoctoral fellow, Department of Maternal and Child Health, Johns Hopkins University School of Hygiene and Public Health, 615 N. Wolfe St., Baltimore, Md. 21205. The data for this study were obtained from the Office of the Assistant Secretary for Health, Department of Health and Human Services. The research was funded partly by biomedical research support grant No. BRS 21-82 from the National Institutes of Health. Tearsheet requests to Dr. Alexander.

home family day care be to the setting of standards for child care or for licensing care providers? Do parents who use these forms of home-based care support Federal subsidization of day care?

A 1975 national study provided a large probability sample of child care consumers with preschool children in which to investigate attitudes toward government intervention in licensing, regulating, and funding day care. This data source is particularly rich in that it allows comparisons between consumers who use child care services in their own homes and those who rely on family day care.

Methods

Data source. Our data were obtained from the National Child Care Consumer Study's stratified national probability sample of households with children ages 14 or younger and with telephones. This telephone survey was conducted in 1975 under the auspices of the Office of Child Development, Department of Health, Education, and Welfare. Extensive information was gathered on child care use in the U.S. civilian, noninstitutionalized population. A 3-stage sampling procedure was used in which 24,000 randomly selected households within 4 census-defined areas—Northeast, North Central, South, and West—were contacted by telephone to identify those with eligible children. Nonwhite and low-income households were oversampled to assure adequate representation.

The data were collected by the field staff of Chilton Research Services, who were subcontracted to do the interviewing for the study (5). The interviews lasted

about 1 hour. The resulting 4,609 interviews represented a 67 percent completion rate; refusals accounted for 14 percent and failures to locate eligible respondents, 19 percent.

Our analysis pertains to a subset of 1,430 households having at least 1 child under 6 years old, in which the mother was the survey respondent and able to name a main or most important method of day care. Since our interest was in the attitudes of mothers of nonhandicapped children, households with handicapped youngsters were eliminated from the analysis.

Measures. Child care, the criterion measure, was characterized as either home-based or center-based care. Four types of home-based care were identified: in-home care by a relative, in-home care by a nonrelative, out-of-home care by a relative, and out-of-home care by a nonrelative. Center-based care users were those mothers who stated that their children were enrolled in day care. All mothers were asked to identify a main or most important method of child care, regardless of the number of types of child care they used. This main method was used to classify child care in the analysis.

Mothers' overall attitude toward licensing was elicited by a single item on a 5-point Likert-type scale ("I think that everyone who takes care of children should be licensed: where 1 = strongly agree and 5 = strongly disagree").

Attitudes concerning government regulation of care were measured by a single item regarding setting standards for individual care givers ("Do you think

Table 1. Unadjusted and adjusted percentages of mothers with children under 6 years old who oppose the licensure of all care givers, according to selected demographic characteristics by type of child care

Demographic characteristics	In home, by relative ¹			In home, by nonrelative ²			Out of home, by relative ³		
	Unadjusted percent	Adjusted percent	Adjusted with covariates	Unadjusted percent	Adjusted percent	Adjusted with covariates	Unadjusted percent	Adjusted percent	Adjusted with covariates
Employment status:									
Full time	.63	.60	.58	.66	.56	.54	.59	.63	.63
Part time	.86	.92	.93	.97	.82	.82	.79	.83	.82
Not employed	.75	.75	.75	.62	.85	.85	.70	.68	.68
Education:									
< High school	.81	.86	.86	.62	.65	.64	.69	.86	.66
High school graduate	.69	.69	.69	.77	.77	.77	.66	.69	.69
> High school graduate	.76	.70	.70	.75	.76	.75	.67	.68	.68
Age of oldest child:									
< 3 years	.69	.69	.69	.76	.77	.77	.74	.74	.74
3-5 years	.77	.78	.78	.81	.81	.81	.65	.64	.64
Poverty:									
Below poverty	.69	.61	.56	.64	.64	.61	.83	.83	.85
At poverty	.75	.75	.75	.80	.83	.83	.62	.62	.62
200 percent or more	.76	.80	.83	.81	.81	.81	.67	.67	.67
Amount paid for care per week:									
< \$10	.66	.64	.64	.80	.74	.74	.71	.70	.70
\$10-\$20	.70	.73	.74	.89	.91	.91	.58	.61	.62
\$21 or more	.70	.73	.73	.75	.91	.91	.70	.69	.69
R	...	.149	.157	...	.212	.213	...	.151	.153
R ²	...	.022	.025	...	.045	.046	...	.023	.023

¹ Average = 74 percent, N = 316.

² Average = 80 percent, N = 250.

³ Average = 68 percent, N = 462.

⁴ Average = 88 percent, N = 214.

⁵ Average = 57 percent, N = 75.

NOTE: Marital status and race are covariates (married = 1 and not married = 0; white = 1 and black = 0).

there should be personal qualifications set for nonrelated people who care for children in the children's home? In other words, should sitters be required to pass health examinations, educational requirements or meet some other kind of standard if they were providing care in your home? yes = 1, no = 0.") Two multi-item measures asked respondents if they agreed or disagreed with the regulation of nine aspects of child care provided in someone else's home and then to evaluate the same aspects of care given in a center. The nine aspects were fire and building safety, cleanliness and sanitation, number of children per responsible adult, training and qualifications of staff, food and nutrition, program content and activities, space per child, counseling and referral services, and health conditions of staff and children. In addition, the respondents were asked if they thought that any standards should be set for care in a private home or center.

Perceptions concerning the government's role in financing child care were measured by a single 5-point Likert item ("I would be willing to have my taxes raised in order to support child care activities; 1 = strongly agree and 5 = strongly disagree"). Government's overall role in child care was measured by the following item: "The government should not be in-

volved in programs to take care of children; where 1 = strongly agree and 5 = strongly disagree."

Statistical methods. Initial comparisons of the distributions of sociodemographic characteristics for child care arrangements were tested by the chi-square statistic. Multiple classification analysis (MCA) was performed to determine the relative influence of selected demographic variables on mothers' attitudes toward the licensure of care providers. We were interested in observing whether certain demographic variables that show an association with negative attitudes toward licensure would differ by the type of child care arrangement used. MCA permits an assessment of the ability of each independent variable to explain variation in the dependent variable both before and after adjustment for the effect of the other predictors. The multiple classification analysis was run separately for each type of child care arrangement by use of the ANOVA program from the Statistical Package for the Social Sciences (SPSS).

Results

Various reports (5-8) support systematic differences in the types of families with children under 6 years old

Table 1. (continued)

Out of home, by nonrelative ^a			Day care ^b		
Unadjusted percent	Adjusted percent	Adjusted with covariates	Unadjusted percent	Adjusted percent	Adjusted with covariates
.94	.98	1.00	.47	.47	.49
.65	.72	.67	.71	.77	.68
.89	.82	.82	.79	.75	.74
.71	.62	.60	.66	.55	.51
.93	.90	.91	.56	.58	.46
.88	.93	.92	.55	.57	.48
.80	.84	.83	.46	.51	.47
.93	.91	.91	.59	.58	.59
.56	.66	.78	.83	.78	.88
.58	.53	.48	.39	.39	.51
.78	.75	.72	.56	.56	.55
.61	.78	.72	.69	.55	.56
.66	.63	.66	.41	.46	.48
.95	.96	.95	.65	.73	.70
...	.260	.297	...	.228	.320
...	.078	.088	...	.052	.103

who select home-based versus center-based child care. In our study, users of home-based care (all four types) were more likely to be white, married, employed, have a high school diploma, and to have a family income 200 percent above the poverty level than were users of center care (χ^2 significant at $P < .001$). Home-based and center users did not differ significantly in their average number of children ($\bar{X} = 2$, $SD = .96$) nor in the distribution of the ages of their children ($\bar{X} = 2$, $SD = .92$).

Although the four groups of home care users did not differ significantly by race, marital status, maternal educational attainment, and family income level, a far greater proportion of mothers using out-of-home care (51 percent by relatives and 63 percent by nonrelatives) were in the labor force than were mothers using in-home care (25 percent by relatives, 39 percent by nonrelatives).

Licensure of care providers. Unregulated family day care accounts for more than 90 percent of all family day care in the United States (10). State efforts to identify and license such care providers have been relatively unsuccessful. Although most States report that they require licensing of family day care, few have the

fiscal capabilities to enforce requirements (9). It has been estimated that only 6 percent of the children in out-of-home care arrangements receive services from a licensed provider (10).

In table 1, we compare the attitudes of mothers who use different forms of care toward the licensure of all child care providers. We dichotomized the distribution of responses to the licensure item so that the mean represents the percentage of mothers who disagree or strongly disagree with licensing.

Overall, mothers who rely on relatives for care were less likely to oppose licensure than were mothers who use nonrelated providers. Licensure may not represent a salient concern for women who have family assistance with child care.

Compared with mothers who use home-based care, center users were least likely to oppose licensure. However, more than one-half of these center users did not support licensing all providers.

The MCA adjusted percentages illustrate differences among the home-based users. Reported incomes of 200 percent above poverty line were associated with increased percentage opposition to licensing among in-home users, whereas mothers with family incomes below the poverty line who used out-of-home family day care were more likely to oppose licensure. For those middle-class women (as defined by family incomes 200 percent above the poverty line) who can afford to employ someone to take care of their children in their own homes yet do not want to be burdened with withholding taxes, social security contributions, and workman's compensation, licensure poses the threat of government surveillance and regulation.

Since the price of child care services is negotiated on an individual basis in unregulated care settings, the licensing of out-of-home providers would have cost implications. Regulation of those providers would certainly include the regulation of price structures, thus potentially increasing the costs of child care. The impact of price standardization would be experienced more acutely by the poor than by the middle-class consumer of child care, perhaps accounting for the greater opposition to licensure by the poor in this study.

In general, full-time employment was related to stronger support of licensing, users of out-of-home non-regulated care were the exception; 100 percent of these mothers did not support licensing of child care providers.

Educational attainment was directly related to a high percentage of opposition to licensing among mothers who used out-of-home care by nonrelatives. Of the mothers who had more than a high school education, 92 percent opposed licensing.

Table 2. Attitudes of 1,271 mothers toward government licensure of nonrelative providers of child care, by type of care

Type of care	Agree		Disagree	
	Number	Percent	Number	Percent
In home, by relative	173	55	144	45
In home, by nonrelative	96	36	170	64
Out of home, by relative	261	55	211	45
Out of home, by nonrelative . .	94	44	122	56

NOTE: $\chi^2 = 31.75$, 3 df, $P < .001$.

Negative attitudes toward licensing were also associated with costs. Mothers who paid more than \$20 per week for child care by nonrelatives were the least supportive of licensing. Since relatives are likely to receive minimal reimbursement for their services, it is not surprising that the licensing attitudes of the mothers who rely on relatives were not affected by variations in child care payments. Although there was somewhat less opposition to licensure among mothers of children under

3 years old than among those whose children were ages 3-5, the differences were minimal and not consistent across all types of child care.

The two covariates, race and marital status, had little effect on the attitudes of home-based care users, but did influence center users. Overall, when the effects of marital status and race were adjusted, the amount of variation in attitudes that could be explained by our set of demographic variables doubled, from 5 to 10 percent. This increase in explained variation can be attributed, in part, to greater variation in race and marital status for center users. Mothers who used home-based care were largely white and married.

Regulation of care. Mothers' opinions about setting standards for providers and for specific aspects of child care facilities showed clear differences among home-based users. A smaller proportion of mothers using nonrelatives as child care providers agreed that nonrelated persons should be required to meet health, education, or other standards (table 2). This finding held for mothers who took their children to a nonrela-

Table 3. Percent agreement to setting standards for child care in someone else's home, by type of care

Main type of care	Fire and safety				Sanitation and cleanliness			
	Agreed		Disagreed		Agreed		Disagreed	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
In home, by relative	244	70	103	30	297	86	50	14
In home, by nonrelative	183	65	98	35	219	78	62	22
Out of home, by relative	314	63	185	37	382	77	117	23
Out of home, by nonrelative	136	59	96	41	176	76	56	24
Day care	64	78	18	22	68	83	14	17
Total	941	65	500	35	1,142	79	299	21
Overall χ^2	$\chi^2 = 15.54$, 4 df, $P < .005$				$\chi^2 = 13.27$, 4 df, $P < .005$			
χ^2 for home-based users	$\chi^2 = 9.22$, 3 df, $P < .01$				$\chi^2 = 12.46$, 3 df, $P < .001$			

Main type of care	Program content				Space per child			
	Agreed		Disagreed		Agreed		Disagreed	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
In home, by relative	145	42	202	58	181	52	166	48
In home, by nonrelative	86	31	195	69	134	48	147	52
Out of home, by relative	174	35	325	65	213	43	286	57
Out of home, by nonrelative	66	28	166	72	106	46	126	54
Day care	35	43	47	57	52	63	30	37
Total	506	35	935	65	686	48	755	52
Overall χ^2	$\chi^2 = 15.88$, 4 df, $P < .005$				$\chi^2 = 16.28$, 4 df, $P < .005$			
χ^2 for home-based users	$\chi^2 = 13.78$, 3 df, $P < .005$				$\chi^2 = 7.59$, 3 df, NS			

tive's home for care as well as those who had a non-relative provide care in the child's home.

Mothers who used in-home care arrangements were more willing to have fire and safety, sanitation, and child to staff ratios standards set for care in someone else's home and were less likely to agree that no standards should be imposed (table 3). A greater percentage of mothers who relied on relatives to provide care in the child's home agreed with imposing standards for all nine aspects of care than did mothers using any other home arrangements.

Mothers who took their children to the home of a nonrelative were less likely to agree that standards should be set for six of the nine aspects of care. In general, center users were supportive of setting standards. Data not shown indicate no significant differences among mothers who use different forms of home-based care regarding health, safety, and educational standards for centers. All four groups of mothers using home-based care supported the regulation of center care and strongly disagreed that no standards should be imposed (all responses 95 percent or greater).

Financing care. Approximately one-third of the home-based and two-fifths of the center users were willing to have their taxes raised in order to support day care. Analysis of the four groups of home-based care consumers failed to reveal any statistically significant differences in attitudes toward day care subsidization, although a somewhat smaller proportion of in-home nonrelative users were willing to have their taxes raised (table 4).

Users did not differ significantly in their perceptions of the role of government in day care. Mothers using out-of-home arrangements were somewhat less likely to support government involvement (nonrelative 18 percent; relative 16 percent) than were in-home users (nonrelative 14 percent; relative 13 percent).

Summary and Discussion

Analysis of data from the 1975 National Child Care Consumer Study indicates that although mothers of preschool children support government involvement in day care, their attitudes differ regarding the regulation of care providers and care settings. Proportionately

Table 3. (continued)

Child to staff ratio				Training and qualifications of staff				Food and nutrition				Total
Agreed		Disagreed		Agreed		Disagreed		Agreed		Disagreed		
Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	
220	63	127	37	117	51	170	49	250	72	97	28	347
179	64	102	36	115	41	166	59	161	57	120	43	281
267	54	232	46	199	40	300	60	333	67	166	33	499
136	59	96	41	86	37	146	63	148	64	84	36	232
68	83	14	17	47	57	35	43	62	76	20	24	82
870	60	567	40	624	43	817	57	954	66	487	34	1,441
$\chi^2 = 30.19, 4 \text{ df}, P < .001$				$\chi^2 = 21.65, 4 \text{ df}, P < .001$				$\chi^2 = 19.16, 4 \text{ df}, P < .001$				
$\chi^2 = 11.58, 3 \text{ df}, P < .005$				$\chi^2 = 14.77, 3 \text{ df}, P < .001$				$\chi^2 = 15.60, 3 \text{ df}, P < .001$				
Counseling and referral				Health conditions of staff and children				No standards set				Total
Agreed		Disagreed		Agreed		Disagreed		Agreed		Disagreed		
Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	
117	34	230	66	225	65	122	35	18	5	329	95	347
57	20	224	80	156	56	123	44	39	14	242	86	281
124	25	375	75	281	56	218	44	80	16	419	84	499
44	19	188	81	131	57	101	43	34	15	198	85	232
29	35	53	65	54	66	28	34	4	5	78	95	82
371	26	1,070	74	649	59	592	41	175	12	1,266	88	1,441
$\chi^2 = 25.67, 4 \text{ df}, P < .001$				$\chi^2 = 9.47, 4 \text{ df}, P < .05$				$\chi^2 = 29.03, 4 \text{ df}, P < .001$				
$\chi^2 = 21.79, 3 \text{ df}, P < .001$				$\chi^2 = 7.72, 3 \text{ df}, \text{NS}$				$\chi^2 = 23.98, 3 \text{ df}, P < .001$				

Table 4. Attitudes of 1,335 mothers toward having taxes raised to support child care, by type of care

Type of care	Strongly agree or agree		Neutral		Strongly disagree or disagree	
	Number	Percent	Number	Percent	Number	Percent
In home, by relative	123	36	70	21	146	43
In home, by nonrelative	76	27	66	22	140	51
Out of home, by relative	163	33	117	24	211	43
Out of home, by nonrelative	75	34	53	24	95	43

NOTE: $\chi^2 = 7.88$, 6 df, not significant.

fewer mothers using out-of-home or family day care supported licensing of providers than did mothers using in-home or center-based care. These out-of-home users were somewhat more reluctant to have health, safety, and nutritional standards set for home care and more likely to agree that no standards should be imposed. Users of nonrelatives as child care providers did not agree with the recommendation that these providers be required to meet health or educational requirements.

Although we found no consistent relationship between reported family income and opposition to licensure, mothers who paid \$20 or more per week for day care were more likely to object to the licensing of all providers. This relationship between child care expenditures and opposition to licensing was particularly striking for mothers who took their children to the home of a nonrelative for care.

Only an estimated 6 percent of all out-of-home child care is licensed (10). Our findings suggest that consumers may oppose efforts by Federal, State, and local governments to license and regulate the remaining 94 percent of out-of-home care. The invisibility of home-based care has economic advantages for both providers and consumers that are not offset by child care deductions or other tax break incentives. Currently, women who wish to remain at home have the opportunity to generate tax-free income by providing low-cost day care. Clearly, the formalization of such home care arrangements by the setting of standards and the enforcement of licensing requirements would have an impact on the price structures of care, and ultimately on the supply of homes providing child care, by decreasing the economic incentives for babysitting.

According to the findings of the National Day Care Home Study (10), regulated home care is, indeed, more expensive than care provided in unregulated private homes. In our study, the consumers most vulnerable to government regulation, the out-of-home or family day care users, voiced the greatest opposition to licensing and regulation.

Although findings from the national study provide

valuable insights into the types of providers and quality of care given to young children in out-of-home settings, we cannot gain such insights into home-based care so long as it remains largely unlicensed. Any efforts to promote greater government involvement in home-based care, however, should include consideration of the practical consequences of these policies for the cost of home care and the supply of home-based care providers.

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Surveillance of Infectious Mononucleosis Cases by Use of Existing Data from State Laboratories

GLYN G. CALDWELL, MD
CLARK W. HEATH, Jr., MD

THE DISCOVERY of Epstein-Barr virus (EBV) in association with Burkitt's lymphoma (BL) (1) and as the cause of infectious mononucleosis (IM) (2,3) has generated interest in anti-EBV immunization (4,5). If such a vaccine were to be developed, demonstration of its effectiveness would require a disease surveillance mechanism whereby patterns of IM could be monitored and compared in immunized and nonimmunized populations. Currently, no such surveillance mechanism exists, and relatively little information has been gathered on patterns of IM incidence in general populations (6). During a 2-year period, 1974-76, we explored the feasibility of using existing information on IM cases reported to State health department laboratories as a basis for ongoing surveillance of incidence patterns. The results of this effort are reported here.

Materials and Methods

The State laboratories of Connecticut, Georgia, Iowa, South Caro-

lina, Virginia, and Wisconsin participated in the study. Each of these laboratories routinely used specific serologic tests for IM, and each was able to provide certain identifying information about individual serum specimens (table 1). Arrangements were made with each laboratory to supply the Centers for Disease Control (CDC) information on a monthly basis on each serum specimen positive for IM testing in whatever form was convenient for the laboratory. Coding, collation, and analysis of data were performed at CDC.

Although data available on individual specimens varied among the laboratories, depending on which items of information were requested from the local physicians who submitted specimens, all of the laboratories were able to provide at least the patient's age, sex, county of residence, and date of specimen collection (tables 1 and 2). Multiple specimens from one patient were usually identified only if those specimens had been submitted simultaneously. The data covered specimens collected over the 24 months from April 1, 1974, through March 31, 1976. Data from Georgia were available only through August 31, 1975. Connecticut,

Georgia, South Carolina, and Wisconsin provided information on all serum specimens tested for IM, whether they were positive or negative.

Diagnostic procedures differed considerably among the participating laboratories (table 1). Five of the six relied on ox cell hemolysin titers—in three laboratories in combination with other tests (South Carolina, Virginia, and Wisconsin). Sheep red blood cell agglutination was used as a screening procedure in Iowa, Virginia, and Wisconsin. In Iowa, screening was followed by measurement of heterophile titers with guinea pig kidney absorption. The monospot test was used in South Carolina and Wisconsin. Testing for antibody against EBV was performed only in Wisconsin. Heterophile antibody titrations were conducted in Connecticut, Georgia, Iowa, and Wisconsin.

Results

Incidence. The number of tests performed by each laboratory is shown in table 2, according to test results. The numbers of specimens handled varied widely among the laboratories. Estimated crude annual incidence rates, calculated

Dr. Caldwell is Chief of the Cancer Branch, Chronic Diseases Division, Center for Environmental Health, Centers for Disease Control, Atlanta, Ga. 30333. Dr. Heath is Director of the Chronic Diseases Division. Tearsheet requests to Dr. Caldwell.

from these data, are shown in table 3. Obviously, completeness of case ascertainment by State laboratories over the 2 years differed greatly. In Connecticut and Wisconsin fairly complete ascertainment seems to have been achieved when their rates are compared with data from other population-based surveys of IM occurrence (7,8). Ascertainment was less complete in Iowa, Georgia, and Virginia and only fractional in South Carolina. Since numerators for these rates represent specimens tested and thus may include a certain number of repeat specimens for individual persons, the incidence values may well be falsely high.

As a further crude measure of the completeness of case reporting, the numbers of counties in each State with and without specimens submitted (whether positive or negative) were tabulated. Only Connecticut (100 percent of counties) and Wisconsin (92.8 percent of counties) approached complete representation. The other 4 States ranged between 39 and 52.8 percent of the counties represented. In Connecticut (9), crude county-specific annual rates ranged from 5.6 to 92.3 positive tests per 100,000 population (table 4). Although these variations may be the result of county differences in completeness of case reporting, they also may reflect differing socioeconomic, racial, and age patterns.

Age, sex, and race. The patterns by age, sex, and race for patients with positive tests were similar to those observed in other studies (7, 8). Positive specimens came most frequently from teenagers (ages 15-19 years); 68 percent of those who had positive specimens were under age 25 (table 5). Females outnumbered males by a ratio of 1:1.2, and they also became ill at a slightly younger age than males. However,

Table 1. Diagnostic procedures for infectious mononucleosis, titer criteria, and specimen data provided by participating laboratories

State laboratory and procedure	Positive titer criteria	Specimen data
Connecticut: microtiter ox cell	1:40+	Patient's age, sex, county of residence, date of specimen collection
Georgia: microtiter ox cell	1:40	Patient's age, sex, race, date of onset, county of residence, date of specimen collection
Iowa: screen with sheep red blood cell (RBC) slide agglutination; positives titrated with Davidson differential, 2 percent sheep RBC, guinea pig kidney absorption	1:64	Patient's age, sex, race, date of onset, county of residence, date of specimen collection
South Carolina: monospot test ox cell hemolysin	1:40	Patient's age, sex, county of residence, date of specimen collection
Virginia: screen with sheep RBC agglutination; confirm with ox cell hemolysin	(¹)	Patient's age, sex, race, occupation, county of residence, date of specimen collection
Wisconsin: microtiter guinea pig absorbed heterophile after screen with capillary sheep RBC test; microtiter ox cell hemolysis monospot test Epstein-Barr virus-immunofluorescent antigen	1:40	Patient's age, sex, county of residence, date specimen received

¹ Not measured.

Table 2. Number of specimens tested for infectious mononucleosis, by State and test results, April 1974-March 1976

State	Positive	Negative	Unknown	Total
Connecticut	2,250	7,368	105	9,723
Georgia ¹	806	2,297	30	2,933
Iowa	1,183	...	...	1,182
South Carolina	23	79	1	103
Virginia	1,368	1	2	1,371
Wisconsin	2,828	4,237	7	7,072
Total	8,258	13,982	145	22,385

¹ April 1974-August 1975 only.

Table 3. Infectious mononucleosis incidence rates, by State, April 1974-March 1976

State	Population (1970 census)	Number of tests positive	Crude annual incidence per 100,000
Connecticut	3,031,709	2,250	37.1
Georgia ¹	4,589,575	806	13.2
Iowa	2,825,041	1,183	20.9
South Carolina	2,590,516	23	0.4
Virginia	4,648,494	368	14.7
Wisconsin	4,417,731	2,828	32.0

¹ April 1974-August 1975 only.

positive tests were reported for both sexes in very young children (ages 0-4 years) as well as very old adults (85 years or older). Race was recorded for only 2,056 persons (24.9 percent) with positive results. As in other studies (7), cases in blacks were rare; in our study, 94.2 percent of the cases were in whites. This racial distribution pattern was similar for both sexes.

Discussion

This pilot study was conducted to gauge the feasibility of ongoing IM

surveillance in the United States by using State laboratories as sources of information on cases. Although the results indicate that data generated from such sources can provide an approximation of certain broad epidemiologic parameters of IM occurrence, the system has major drawbacks.

First, since only a few States process a sufficient proportion of all expected IM case diagnostic material, a reasonably complete geographic coverage of case incidence cannot be achieved. In fact, it is ex-

pected that even fewer States will be doing the tests. For example, South Carolina's State laboratory stopped shortly after entering the study; until that time it had regularly processed sizable numbers of specimens. This projected falloff may result from the increased use of monospot tests and other simplified procedures for IM diagnosis directly in physicians' offices. In the absence of continuing central sources of case incidence data in a substantial number of States, surveillance would be difficult to maintain.

Second, the data available on individual IM cases vary widely from State to State, in terms of types of data and of the regularity and completeness with which data are recorded. In particular, information on date of specimen collection is only an approximation of date of case onset. Also, the likely occurrence of repeat specimens on individual persons is difficult to identify, which further impedes the data's usefulness.

Third, there is wide variation among State health departments in their laboratory procedures and criteria used for diagnosing IM. Obviously, this variation limits how precisely one can compare surveillance findings within States.

Fourth, even within States with relatively complete case ascertainment through State laboratory facilities (Connecticut and Wisconsin, for instance), it is likely that completeness of reporting varies greatly among intrastate divisions. The absence of case information on such important variables as race and socioeconomic status confounds this problem; in the absence of such data, one cannot be certain to what extent differences may reflect such variables and not just frequency of reporting.

Finally, the usefulness of surveil-

Table 4. Infectious mononucleosis incidence rates, by county, Connecticut, April 1974-March 1976

County	Population (1970 census)	Number of tests positive	Crude annual incidence per 100,000
Fairfield	792,814	327	20.6
Hartford	816,737	1,181	72.4
Litchfield	144,091	545	5.6
Middlesex	114,816	463	27.4
New Haven	744,948	348	23.4
New London	230,348	99	21.5
Tolland	103,440	25	12.1
Windham	84,515	256	92.3
Unknown .....	.....	5	...
State total	3,031,709	2,250	37.1

Table 5. Positive tests for infectious mononucleosis by age and sex, 6 States, April 1974-March 1976

Age group (years)	Male	Female	Unknown	Total
0-4	50	34	0	84
5-9	123	111	3	237
10-14	239	474	5	718
15-19	1,435	2,076	14	3,525
20-24	730	635	1	1,384
25-29	214	149	0	363
30-34	87	67	0	154
35-39	32	38	0	70
40-44	25	15	1	41
45-49	14	14	0	28
50-54	14	15	0	29
55-59	3	6	0	9
60-64	6	8	0	14
65-69	1	1	0	2
70-74	2	1	0	3
75-79	0	0	0	0
80-84	0	1	0	1
85 and over	3	4	1	8
Unknown	593	692	33	1,588
Total	3,571	4,359	283	8,258

Table 6. Positive tests for infectious mononucleosis by race and sex, 6 States, April 1974-March 1976

Race	Male	Female	Unknown	Total
White	696	1,038	2	1,936
Black	47	72	0	119
Other	1	0	0	1
Unknown	2,627	3,259	326	6,202
Total	3,571	4,359	328	8,258

lance for a disease such as IM, even if suitable data could be attained, is questionable. Previous studies have established quite clearly that the disease only rarely occurs in epidemic form (10,11), that many epidemics are spurious (12), and that IM usually follows predictable patterns defined largely by socioeconomic factors. In the absence of applicable immunization techniques, no public health control measures are currently available, and hence, surveillance can provide no direct service in measuring control effectiveness. Although continued epidemiologic studies of IM are needed, including basic studies of EBV infection more generally,

it is unclear what useful role surveillance can play at present, unless reasonably complete case-reporting systems could be established.

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SYNOPSIS

CALDWELL, GLYN G. (Center for Environmental Health, Centers for Disease Control), and HEATH, CLARK W., Jr.: *Surveillance of infectious mononucleosis cases by use of existing data from State laboratories. Public Health Reports, Vol. 97, November-December 1982, pp. 579-582.*

In a pilot study to explore the

feasibility of surveillance of cases of infectious mononucleosis, data were collected on 8,258 positive specimens. These specimens had been submitted to six State laboratories—Connecticut, Georgia, Iowa, South Carolina, Virginia, and Wisconsin—during a 2-year period, April 1974-March 1976. Case reporting varied in completeness and geographic cover-

age. Data concerning case occurrence, by age, sex, and race of patients and month of specimen collection, confirmed previous observations regarding the descriptive epidemiology of the disease. The results indicated that the public health usefulness of extensive surveillance of infectious mononucleosis laboratory tests is limited.

Services for and Needs of Pregnant Teenagers in Large Cities of the United States, 1979-80

HELEN W. WALLACE, MD
JOHN WEEKS, PhD
ANTONIO MEDINA, MD

OF APPROXIMATELY 1,142,000 PREGNANCIES among U.S. teenagers in 1978, 434,000 ended in abortion and 362,000 resulted in births of infants conceived out of wedlock, 192,000 in births of infants conceived following marriage, and the remainder in miscarriages (1). Between 1973 and 1978, the number of teenage pregnancies increased by 13 percent; the rise was steepest among 18-19-year-olds, less steep among 15-17-year-olds, and slight among those under 15 years. In 1978, 18-19-year-olds accounted for 685,000 pregnancies, 15-17-year-olds for 425,000, and those under 15 years for 30,000 (1).

Although the proportion of all teenagers who became pregnant between 1973 and 1978 rose from 10 to 11 percent, the proportion among the sexually active declined from 27 to 23 percent. More than one-fifth of the premarital first pregnancies among teenagers occur within the first month after initiation of sexual intercourse, and half occur in the first 6 months thereafter (1). Of the 1.1 million pregnancies that occurred among teenagers in 1978, 847,000 were unintended, that is, 85 percent of the 749,000 pregnancies among

unmarried teenagers and 51 percent of the 349,000 pregnancies among married teenagers (1).

Unwed teenage mothers rarely give up their babies for adoption or for care by relatives or friends. Ninety-six percent keep their children with them. About 1.3 million children in the United States are now living with 1.1 million teenage mothers (1).

The consequences of teenage childbearing are serious. The infant mortality rate for babies born of teenage mothers is twice that of babies born to mothers in their twenties. Babies born to teenage mothers are more likely to be of low birth weight. Teenage childbearing interrupts, and may cause termination of, a teenager's education. The income of young teenage mothers is half that of those who first give birth in their twenties. Marriages are disrupted three times more frequently among young teenagers who give birth than among older childbearers. In 1975, about half of the \$9.4 billion invested in the Aid to Families with Dependent Children program went to families in which the mother had given birth as a teenager. Families headed by young mothers are seven times as likely as other families to be poor (1).

Questionnaire Survey 1979-80

Because teenage pregnancy is a serious social, health, educational, and vocational problem for both the mother and her infant, we initiated a series of national surveys on the status of services for, and the needs of, pregnant teenagers in the large cities of the United States. This report is based on the study done in 1979-80, the third in the series (2,3). To collect data for this study, a questionnaire was sent during

Dr. Wallace is professor and head, Division of Maternal and Child Health, Graduate School of Public Health, and Dr. Weeks is chairman, Department of Sociology, San Diego State University, San Diego, Calif. 92182. At the time of the study, Dr. Medina was a lecturer in maternal and child health, University of California School of Public Health, Berkeley. The study was supported by a grant from the Office of Maternal and Child Health, Department of Health and Human Services. In the early phase of the study, Dr. Hyman Goldstein, who at that time was a biostatistician and lecturer in the Maternal and Child Health Program, University of California School of Public Health, Berkeley, participated in the data collection. Tearsheet requests to Dr. Wallace.

Table 1. Responses of large U.S. cities to 1979-80 questionnaire, by population

Population	Total cities surveyed	Respondents			
		Total cities	Departments of education and of health	Education department only	Provided no data
1 million or more	6	6	4	1	1
750,000-999,999	3	3	1	2	0
500,000-749,999	16	13	13	0	0
350,000-499,999	14	11	10	1	0
250,000-349,999	16	15	11	4	0
175,000-249,999	19	15	12	2	1
150,000-174,999	15	¹ 13	9	2	1
125,000-174,999	25	22	15	1	6
100,000-124,999	38	² 29	20	3	5

¹ Includes 1 city in which only the health department responded.² Includes 1 city that reported it had no program.

late 1979 and early 1980 to local departments of health and local departments of education in the 153 cities which, according to Bureau of Census estimates, had a population of 100,000 or more in 1978. Followup re-mailings were done periodically to ensure an adequate response rate. The same questionnaire was used in the 1970, 1976, and 1979-80 surveys except that in the 1976 and 1978-80 surveys, new questions were added in regard to followup services, school dropouts, and child abuse and neglect.

Questionnaire Responses

The overall response to the 1979-80 questionnaire was 83 percent. The response rate was higher among the larger cities; cities with the smallest populations (under 125,000) had the lowest response rate. In 95 of the 127 cities responding, responses came from both the local department of health and the local department of education or from one of these departments after consultation with the other department; in 16 cities, responses came from only one local department without consultation with the other; 15 other cities that responded to the questionnaire provided no data (table 1).

Special program for pregnant teenagers. Of the 127 cities responding to the 1979-80 questionnaire, 112 answered the question about the provision of a special program for pregnant teenagers, and 90 reported that they provided such a program (table 2). Of the 92 cities providing information on when the special program began, 64 reported that it began in the period 1966-74 and 33 that it began in the period 1969-70. Two cities had initiated their special program for pregnant teenagers in the early 1900s. Only 11 cities reported that they had begun their special program since 1972.

Fifty-three cities provided data on the size of their

female populations 15-19 years old and on the number of pregnant teenagers served by the special programs. They reported a total population of 903,214 girls aged 15-19 years. If we use Zelnik and Kantner's findings that 35 percent of girls 15-19 years old in the United States are sexually active (4), an estimated 299,139 females aged 15-19 years in these 53 large cities are sexually active. Yet in these cities, only 9,234 pregnant teenagers were cared for in the special programs in 1979-80 (3.1 percent of those estimated to be at risk of pregnancy).

By far the most common sponsors of special programs were local departments of education—83 cities, followed by local health departments—24 cities (table 3). Maternity and Infant Care Projects were reported as sponsors in seven cities. Voluntary agencies sponsored programs in 28 cities.

Funding for the special programs was reported to be almost entirely governmental—local, State, or Federal (table 3). The most common local sources of funds were city or county schools; fiscal participation

Table 2. Responses of large U.S. cities to question about the provision of special programs for pregnant teenagers, 1979-80 survey, by population

Population	Total respondents	Provided special program		
		Yes	No	No answer or answer unclear
1 million or more	6	5	1	0
750,000-999,999	3	3	0	0
500,000-749,999	13	11	2	0
350,000-499,999	11	11	0	0
250,000-349,999	15	12	2	1
175,000-249,999	15	10	4	1
150,000-174,999	13	10	1	2
125,000-149,999	22	11	4	7
100,000-124,999	29	17	3	9

Table 3. Sponsorship and sources of funds and of medical care in special programs for pregnant teenagers, 1979-80 survey

Sponsorship and sources of funds and medical care		Number of cities	Sponsorship and sources of funds and medical care		Number of cities
Sponsorship			Sources of funds—continued		
Official agencies:			Health department		
Education departments		83	Special education department		4
Health departments		24	Welfare department		1
Maternity and Infant Care Projects		7	Federal		42
Social service departments		6	Title 5 funds (Maternal and Child Health)		10
Health centers		3	Title 20 funds (social services)		8
Mental health centers		1	Education funds		6
Voluntary agencies:			"Federal" funds (unidentified)		5
Florence Crittenton agency		9	Title 5 funds (Maternal and Infant Care Projects)		4
Medical schools		5	Title 10 funds (Family Planning)		3
Hospitals		3	Title 19 funds (Medicaid)		2
YWCA		3	Vocational funds		2
March of Dimes		1	Title 5 funds (Children and Youth Projects)		1
United Way		1	"Federal health" (unidentified)		1
Other		6	Other		7
Sources of funds			Question not answered		21
Local		74	Sources of medical care		
Official agencies		60	Official agencies		
Local education department		24	Health departments		31
City education department		15	Maternity and Infant Care Projects		18
County education department		7	Health centers		5
County health department		3	Medicaid		2
Local health department		2	U.S. Navy		2
City health department		1	Other		2
"Local" (department unidentified)		6	Voluntary agencies		
"City" (department unidentified)		1	March of Dimes		1
"County" (department unidentified)		1	Planned Parenthood		2
Voluntary agencies		14	HMOs (health maintenance organizations)		2
United Way		7	Other		5
Florence Crittenton agency		2	Miscellaneous		
March of Dimes		2	Medical schools		11
Children's Home Society		2	Hospitals		23
Booth (Salvation Army) programs		1	Clinics		14
State		53	Private physicians		26
Education department		35			
"State" (department unidentified)		7			

by local health departments was relatively small. State funds also came predominantly from departments of education. Federal support came from a variety of sources—funding under Title 5 of the Social Security Act (Maternal and Child Health), under Title 20 of the Social Security Act (Social Services), and under Title 10 of the Public Health Service Act (Family Planning). Altogether, 63 cities reported that education funds were a source of support of the special programs, 30 reported that health funds helped support the program, and 11 reported welfare or social service funds as sources of support (table 3).

Fifty-four cities reported that they provided a special program of medical care for pregnant teenagers; 42 reported that they did not.

Medical care. Medical care for the pregnant teenagers in the special programs was provided by hospitals, private physicians, Maternity and Infant Care Projects,

health departments, clinics, and medical schools. The sources of medical care reported were primarily those of organized community programs (table 3).

The medical care providers most frequently used by pregnant teenagers were obstetricians (65 cities) and pediatricians (47 cities). Nine cities reported that nurse midwives were providing the medical care for pregnant teenagers. The babies of the pregnant teenagers were typically delivered in a hospital and usually by an obstetrician. Medical care for the pregnant teenagers was provided in clinics, hospitals, private physicians' offices, health departments, and Maternity and Infant Care Projects (table 4). Medical care for infants was provided in private physicians' offices, health departments, clinics, hospitals, well children conferences, and Children and Youth Projects.

Other services provided. The types of services most frequently provided by the special programs were coun-

selling (92 cities), special education (84), nutrition (84), family life education (84), and sex education (81). As table 5 shows, the least frequent types provided were treatment of drug abuse (13 cities), alcoholism (16), abortion (17), juvenile delinquency (18), legal advice (20), and maternity homes (20).

Pregnancy testing for teenagers was reportedly provided in 89 cities. The agencies most frequently providing this testing were health departments (53 cities), Planned Parenthood (43), hospitals (12), and clinics (9). Nine cities reported that pregnancy testing services were not freely available.

Ninety-two cities reported that contraceptive services were available for teenagers. The contraceptives were available from the following sources:

<i>Source of contraceptives</i>	<i>Number of cities</i>
Planned Parenthood	57
Health department	51
Hospital	11
Clinic	8
Private physician	6
Family planning clinics	6
Maternity and Infant Care Project	3
Health centers	2
Miscellaneous	3

The cities reported some restrictions on contraceptive services to teenagers: 14 required parental consent, 11 had age restrictions, 9 required payment of a fee, 6 required a financial eligibility test, 4 had legal restrictions, in 4 cities the service was unavailable, 3 provided the services only to teenagers who had a previous pregnancy, and 2 provided the services only to married teenagers.

Fifty-five cities reported that abortion services were freely available for teenagers, and 28 cities reported that they were not. The restrictions on these services included length of gestation, 38 cities; legal, 23 cities; funds, 15 cities; unavailability of the services, 13 cities; parental consent, 7; religion, 6; available only to inpatients, 4; age of patient, 2. Abortion services were provided by clinics, private physicians, and hospitals, in clinics and hospitals. In 64 cities, these services were paid for by patients and in 26 cities, by Medicaid.

Two-thirds of the cities (84 of 127) reported providing a special education program for pregnant teenagers; 11 reported that they did not. When this was offered, it was more frequently provided in high school (96 cities) or junior high school (91 cities) than in elementary school (55 cities). Special education was most frequently provided in special schools (76 cities); less frequently in special classes (31 cities) or in home instruction (49 cities). It usually included family life education, special health classes, and sex education. It

less frequently included premarital or marital counseling.

Only nine cities reported that there was a waiting list for the special education program. In the nine cities, the duration of the wait ranged from a few weeks to as long as 9 months. The number on the waiting lists varied from 6 to 150.

Ninety-six cities reported providing social services for pregnant teenagers, and six reported that they did not. Social services were most frequently provided by welfare, education, and health departments, by Maternity and Infant Care Projects, and by voluntary agencies. The social services most frequently available were counseling (88 cities), adoption (77), referral for job training or placement (69), clothing (69), and day care (69). Services less frequently available were housing, help for the father, foster home placement, and transportation.

Ninety-eight cities reported that nutrition services were available for pregnant teenagers, and four cities reported they were not available. The nutrition services most frequently available were education (92 cities); extra food (65); special school lunch (59) or breakfast (40) or food stamps (47); and WIC (Women, Infants, and Children nutrition program).

Eighty-five cities reported that nutrition services were available for infants, and 17 reported that they were not. The nutrition services most frequently available were education of the mothers about infant feed-

Table 4. Number of cities using various sources and sites for medical care of pregnant teenagers and infants, 1979-80 survey

<i>Source or site</i>	<i>Pregnant teenagers</i>		<i>Source of care of infants</i>
	<i>Source of care</i>	<i>Site of care</i>	
Health departments	31	25	48
Private physicians	25	42	53
Hospitals	23	36	37
Maternity and Infant Care Projects	18	11	4
Clinics	15	30	21
Medical schools	11	3	3
Health centers	5	7	8
HMOs (health maintenance organizations)	2	1	1
Children and Youth Projects	2	1	11
U.S. Navy	2	3	1
Planned Parenthood	2	0	0
Midwives	2	0	0
Schools	1	4	0
Florence Crittenton agency	0	2	0
Pediatricians	0	0	7
Obstetricians	0	0	4
General practitioners	0	0	2
Medical residents	0	0	2
Miscellaneous	7	1	2

Table 5. Number of cities providing special services in their programs for pregnant teenagers, by population, 1979-80 survey

Special services	Cities with populations of—									Total with service
	1 million or more	750,000-999,999	500,000-749,999	350,000-499,999	250,000-349,999	175,000-499,999	150,000-174,999	125,000-149,999	100,000-124,999	
Counseling	4	3	11	11	13	11	9	11	19	92
Special education	4	3	10	9	13	8	10	10	17	84
Nutrition programs	4	3	12	9	12	9	8	11	16	84
Family life education	5	2	9	10	13	9	10	11	15	84
Sex education	5	1	11	10	12	9	9	11	13	81
Special health classes	3	3	9	9	11	8	10	10	16	79
Social services	5	1	11	10	12	10	6	10	13	78
Home visiting	4	1	10	9	11	7	9	10	12	73
Vocational assistance	4	3	7	7	10	8	7	7	12	65
Interdisciplinary staff	4	1	10	8	11	7	6	5	11	63
Contraception	0	1	8	9	11	3	4	7	10	53
Special medical care	2	1	9	9	8	5	3	7	8	52
Pregnancy testing	1	1	8	7	8	7	3	6	3	44
Day care of infants	1	0	4	4	9	5	2	3	7	35
Adoption	0	1	4	4	7	4	2	4	8	34
Special work with fathers	3	2	4	6	5	4	1	5	4	34
Psychiatric service	2	1	4	7	7	3	1	3	5	33
Truancy	0	0	5	4	4	1	3	4	4	25
Maternity homes	1	1	3	2	5	2	2	2	2	20
Legal advice	0	0	3	3	3	1	3	2	5	20
Juvenile delinquency	0	0	5	2	1	1	2	3	4	18
Abortion	0	1	3	1	3	1	1	2	5	17
Treatment for alcoholism	0	1	4	1	2	1	1	2	4	16
Treatment for drug abuse	0	1	3	1	2	1	0	1	4	13
Question not answered	0	0	1	0	2	3	0	4	1	11

ing (76 cities), extra foods (65), and food stamps (46). More cities (98) reported the availability of special nutrition services for the pregnant teenagers than for their infants (85).

Sixty-two cities reported that they provided followup services for the mothers, and 46 reported that they did not. The followup service most frequently provided was family planning or postpartum care. The duration of followup of the mothers varied from weekly home visits to a 3-year period of surveillance. Fifty-one cities reported providing followup services for the infants, and 52 reported that they did not. The duration of followup of infants varied from weekly home visits to a 6-year period of surveillance.

There were 2,248 teenagers who dropped out of the special programs following the pregnancy and 1,107 teenagers who dropped out during the pregnancy. The most frequent reasons given for the dropouts were lack of motivation, lack of child care, mobility, health reasons, reentry into original school, and transportation difficulties.

Fourteen cities reported that child abuse and neglect were common problems affecting the babies born to the teenage mothers in the special programs; 63 cities reported that these were not problems.

Unmet needs of pregnant teenagers. The question-

naire contained two items relating to unmet needs in the care of pregnant teenagers and their infants. The unmet needs reported by the cities are summarized in table 6. Day care or child care was the most commonly reported unmet need for pregnant teenagers under 15 and 15-19 years of age, as well as for their infants. The second most commonly reported need for both age groups of pregnant teenagers was for funds. For infants, the second most commonly reported need was for parenting.

Discussion

Comparison of the results of the 1979-80 and the 1976 surveys revealed that few large cities (only five) had added a special program for teenage pregnant girls and their infants in the interim 3-year period, even though the number of teenage pregnant girls cared for in the special programs continued to be small compared with the total number of teenagers in these large cities who became pregnant each year. These consistent observations that very limited services are available for teenage pregnant girls and their infants should lead to studies of the reasons that the cities are unable to expand and extend these services. Is the primary reason lack of funds for the services needed? Or is the inability due to attitudes of parents, school board members, school administrators, legislators, and teachers?

Funds for special programs for pregnant teenagers come from a combination of local, State, and Federal sources and from local voluntary agencies. The most common sources of funds reported in the survey were local, State, and Federal schools and departments of education. In 1978 the Adolescent Pregnancy and Prevention Act made special funds available to official and voluntary education, health, welfare, and other community agencies. This legislation expired in September 1981 but was replaced by the new Adolescent Family Life bill, which has an appropriation of \$16 million.

The 1979-80 survey showed that social services, health education, and vocational, health, and educational services for pregnant teenagers need to be improved and extended, as do also day care and social and health services for their infants. The survey pointed up unmet needs in the care of pregnant teenagers and their infants in large U.S. cities.

Contraceptive services, along with family life education and sex education, should be given high priority for sexually active teenagers; yet nine other services are provided more frequently than contraceptives according to the survey (table 6). Demonstration programs need to be established to test and evaluate methods directed at reducing the incidence of teenage pregnancy in the United States. More efforts at family life education also need to be tried and evaluated. Furthermore, such education should be combined with and evaluated with counseling and family planning services.

Followup services for both the pregnant teenager and her infant need to be improved. Because both are at high risk, continued efforts are needed with both mother and infant. For the mother, that means providing medical and health care, social services, family planning, and assistance in continuing her education, combined with planning for her future. For the baby, that means providing day care, health supervision and medical care, social and nutrition services, and so forth. Organized community services should be mobilized for this high-risk population of teenage mothers and their children and continued until they are able to revert to a "normal risk" level. The problem of dropouts from the special programs for pregnant teenagers needs more attention. Also, to focus on the pregnant teenager alone will continue to be ineffective until her male partner and her family are included.

Summary

The third in a series of national surveys of the services for and needs of pregnant teenagers and their infants in large cities of the United States was conducted in

Table 6. Number of cities reporting that various needs of pregnant teenagers and their infants were unmet, 1979-80 survey

Service	Unmet needs of pregnant girls		Unmet needs of infants
	Under 15 years	15-19 years	
Day care and child care.	44	39	52
Family planning	18	15	1
Sex education	19	12	3
Transportation	21	14	9
Parenting education	19	20	30
Continuing education ...	22	22	6
Counseling	20	16	4
Funds	22	23	8
Nutrition	11	6	13
Prenatal care	10	5	1
Health and medical services	20	13	...
Family life education ...	11	10	3
Infant care	8	7	8
Involvement of father ..	8	13	1
Followup	8	5	3
Health education	5	7	...
Abortion	4	5	...
Baby sitting	...	...	5
Job and vocational assistance	8	31	4
Housing	11	16	9
Social services	4	5	8
Health and medical care.	...	...	20
Miscellaneous	28	32	21

1979-80. Only five of these cities were found to have established a new program for pregnant teenagers since the 1976 survey. Major unmet needs continued to exist in health supervision and medical care, education, social services, vocational assistance, financial aid, and day care for infants, as well as in family life education, family planning, and abortion services. The 1979-80 survey provides baseline data on the status of the health, social, and educational care of pregnant teenagers and their infants in large U.S. cities in the period before large reductions in Federal support for this population group had been effected.

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PHS Steps Up Activities and Increases Grant Support to Combat Acquired Immune Deficiency Syndrome

■ Dr. Edward N. Brandt, Jr., Assistant Secretary for Health, has directed agencies of the Public Health Service (PHS) to step up activities to combat acquired immune deficiency syndrome (AIDS), a little understood syndrome afflicting increasing numbers of people in the United States.

Pneumocystis carinii, a rare lung disease that may be linked to acquired immune deficiency syndrome, was reported to have developed in three hemophilia patients. AIDS, complicated by such medical problems as Kaposi's sarcoma and opportunistic infections, has recently been reported in several population groups; namely, homosexual men, recent Haitian entrants, and intravenous drug abusers.

"The lung infection in three patients with hemophilia is disturbing," Brandt stated. "At this time, however, we cannot be sure there is a connection between blood products used by these patients and AIDS. Patients with hemophilia should continue to rely on the treatment prescribed by their doctors."

After learning of the three cases, PHS officials called an open meeting on July 27, 1982, to consider the ramifications of the problem. In addition to PHS agencies, representatives of the National Hemophilia Foundation, Red Cross, various blood banking organizations, National Gay Task Force, New York City Department of Health, and the New York Inter-Hospital Study Group on the Acquired Immune Deficiency Syndrome and Kaposi's sarcoma attended the meeting. The discussions of the groups formed the basis for a series of recommendations to the Service for further investigations.

To supplement the Service's ongoing

epidemiologic surveillance of AIDS, and its laboratory studies and clinical investigations, Brandt issued the following instructions.

1. The Centers for Disease Control (CDC) will continue their work with the National Hemophilia Foundation, hemophilia treatment centers, and others to determine if other cases of AIDS have occurred or are occurring in other patients with hemophilia.

2. CDC and the National Heart, Lung, and Blood Institute will work jointly to formulate a plan for testing patients with hemophilia in order to assemble data relating to the immune system.

3. The Food and Drug Administration's Advisory Panel on Blood and Blood Products will review all possible techniques that might decrease or eliminate infectious risks from Factor VIII, the blood product most commonly used to treat hemophilia A, and will report the outcome of its deliberations to the Assistant Secretary for Health.

4. The National Cancer Institute will act as expeditiously as possible to review and fund promising research projects related to AIDS. The Institute had allocated an estimated \$2.4 million in fiscal year 1982 for research related to AIDS. The Institute's director, Dr. Vincent T. DeVita, Jr., announced in September that \$165,194 in additional grant support was being awarded to 10 investigators. The support provided to them is in addition to funds for current NCI research, as well as funds set aside for fiscal year 1983 to support research in this area. Following are the 10 investigators and their awards.

- Neal Martini, MD, Memorial Sloan-Kettering Cancer Center: to facilitate

collection of tissue and tumor specimens from patients with AIDS—\$15,000

- Erwin Fleissner, PhD, Memorial Sloan-Kettering Cancer Center: to investigate the possible role of viruses in the causation of AIDS—\$15,000

- Richard O'Reilly, MD, Memorial Sloan-Kettering Cancer Center: to study the possible role of bone marrow transplantation and other nonchemotherapeutic forms of treatment in the syndrome—\$15,000

- David Schottenfeld, MD, Memorial Sloan-Kettering Cancer Center: for epidemiologic studies on AIDS, data collection, and analysis—\$15,000

- Yong Sung Choi, MD, PhD, Memorial Sloan-Kettering Cancer Center: to study immune regulation and other functions of the immune system—\$15,000

- Bo Dupont, MD, DSc, Memorial Sloan-Kettering Cancer Center: to study the relationship of certain genetic phenomena and immune function in patients with AIDS—\$15,000

- Michael Marmor, PhD, New York University: for clinical and laboratory studies on Kaposi's sarcoma patients and animal studies—\$25,418

- Donald Abrams, MD, University of California, San Francisco: to expand the ability to collect data on AIDS patients in a specialized clinic—\$19,777

- John Fahey, MD, University of California, Los Angeles: to extend initial immunological studies on the basis for immune deficiency in patients with AIDS—\$15,000

- Richard Steckel, MD, University of California, Los Angeles: to expand ongoing epidemiologic studies on AIDS patients in California and their contacts—\$15,000

Public Health Service and Kuwait Sign Cooperative Agreements

■ The Department of Health and Human Services (DHHS) has recently signed a series of agreements with the Ministry of Public Health of Kuwait. These agreements are designed to provide Kuwait with technical assistance on health matters on a reimbursable basis.

Situated near the apex of the Persian Gulf, Kuwait occupies an area of desert terrain slightly smaller than New Jersey. For generations Kuwait's crossroads location on the Persian Gulf has supported lifestyles geared to fishing, seafaring, and trade. The discovery of oil in Kuwait and its later precipitous climb in value during the 1970s have dramatically altered these traditional patterns, bringing both unique opportunities and problems.

Kuwait's population of 1.5 million people is the result of a 650 percent population increase over the past 25 years. This high rate of growth stems from high fertility and an influx of foreign workers, who are needed to support Kuwait's burgeoning economy. Today, foreign nationals comprise 58 percent of the population, as compared with 47 percent in 1957. Kuwait's Ministry of Public Health, which is responsible for the planning and provision of medical care and public health services, estimates that foreign nationals comprise 75 percent of its 22,000 work force. Rapid socioeconomic development has led to improved health status and an expanding health care system. However, there are serious health problems related to urbanization, the changing patterns of disease, overuse of health services, and the dependency on an expatriate health work force.

With the Kuwait National Health Plan providing guidance, the Ministry of Public Health and DHHS began in 1980 to explore areas of possible collaboration. This resulted in a broad Memorandum of Agreement for the U.S.-Kuwait Technical Cooperation Program in Health, which was signed by Minister Al-Awadi and DHHS Assistant Secretary for Health Edward N. Brandt, Jr., on May 8, 1981. This agreement was entered into under the reimbursable authorities provided by Section 607 of the Foreign Assistance Act. The Memorandum of Agreement makes

available to Kuwait, on a mutually agreed basis, technical assistance managed by the U.S. Public Health Service (PHS) in accordance with the Service's program and administrative management systems. The assistance to be provided may come directly from PHS staff or from extramural sources. The memorandum provides that full financial responsibility for all mutually approved program activities will be borne by Kuwait.

During the past year, the Public Health Service has conducted a series of assessments in response to specific requests from the Kuwait Ministry of Public Health. These activities resulted in the joint approval on July 1, 1982, of the following five technical assistance projects. (The PHS component, listed in parentheses after the description of each project, is responsible for coordinating that particular project.)

1. Emergency medical services. The Public Health Service will assist in upgrading prehospital care for basic life support, in improving hospital emergency capability to advanced life support levels, and in establishing the necessary subsystems for expansion to a national emergency medical service system (Health Resources and Services Administration);

2. Hypertension control. After adoption of an appropriate hypertension management protocol, three baseline studies will be done: a medical record audit, a survey of physicians' knowledge of hypertension, and a survey of the public's knowledge of it. Then, recommendations for further interventions will be prepared (National Heart, Lung, and Blood Institute, National Institutes of Health);

3. Reduction of infant and childhood mortality. Activities will include efforts to improve vital records, assess risk factors, reduce gastroenteritis and perinatal deaths, and plan programs in respiratory disease, immunization-preventable disease, injury control, congenital abnormalities, health education, and nutrition (Centers for Disease Control with assistance from other PHS program components);

4. Health manpower development and utilization. An assessment of Kuwait's current health manpower avail-

ability, productivity, and needs will be conducted (Health Resources and Services Administration); and

5. Vital and health statistics. Three components are involved: improved vital statistics through a systems evaluation and the development of staff, improvement in medical records and patient tracking, and preparation for a national health survey (National Center for Health Statistics).

It is believed that completion of these five projects will aid the Kuwait Government and serve as a basis for future cooperation and friendship between Kuwait and the United States.

—GERALD A. FAICH, MD, and HOWARD LERNER, Office of International Health

Surgeon General Koop Urges Physicians to Warn Patients of Marijuana's Harm

■ C. Everett Koop, Surgeon General of the Public Health Service, recently issued a statement calling on physicians and professionals to advise parents and patients about the harmful effects of marijuana and to urge discontinuance of its use.

The health consequences of marijuana use have been the subject of scientific and public debate for almost 20 years. Based on scientific evidence published to date, Public Health Service leaders have concluded that marijuana has a broad range of psychological and biological effects, many of which are dangerous and harmful to health.

More than a quarter of the U.S. population has used marijuana, and use of this drug has increased thirty-fold among U.S. youth in the past 20 years. Moreover, the age at which it is first used has been consistently getting lower; now use of the drug most often begins in the junior high school years. In 1978, nearly 11 percent of high school seniors used marijuana daily. Although this figure declined to 7 percent in 1981, daily use of the drug in this age group is still greater than daily use of alcohol. More high school seniors smoke marijuana than smoke cigarettes; currently, 32 percent use

marijuana (that is, had used it in the 30 days before being surveyed), and 29 percent smoke tobacco.

Koop said he was especially concerned about the long-term developmental effects of marijuana use on children and adolescents, who are particularly vulnerable to the drug's behavioral and physiological effects. The "amotivational syndrome" has been attributed by some to prolonged use of marijuana by youth. This syndrome is characterized by a pattern of loss of energy, diminished school performance, harmed parental relationships, and other behavioral disruptions. Although more research is required to clarify the course and extent of these manifestations, up to 40 percent of heavy users have reported in recent national surveys that they have observed some or all of these symptoms in themselves.

On March 24, 1982, Secretary of Health and Human Services Richard Schweiker transmitted to the U.S. Congress a report reviewing the health consequences of marijuana use.

The Public Health Service's review of the health consequences of marijuana supports the major conclusion of the National Academy of Sciences' Institute of Medicine; namely, that

"What little we know for certain about the effects of marijuana on human health—and all that we have reason to suspect—justifies serious national concern."

Two Leprosy Antigens Isolated at Colorado State

■ Investigators at Colorado State University (CSU) have isolated and characterized two antigens specific to *Mycobacterium leprae*, the organism responsible for causing leprosy. As a result, it may soon be possible to diagnose and treat the disease before it becomes symptomatic. The laboratory group, led by Dr. Patrick J. Brennan, associate professor of microbiology, conducts extensive research in leprosy under contract to the National Institute of Allergy and Infectious Diseases, National Institutes of Health.

The investigators' results are especially timely because *M. leprae* has begun to develop resistance to dapsone. This drug, which has been in use for more than 30 years, has effectively

controlled the disease and enabled its victims (approximately 12 million worldwide) to live in the community.

Both of the antigens isolated by the Colorado group are glycolipids. The fatty segments (lipids) have been found in other mycobacteria (for example, the one causing tuberculosis), but the investigators found the sugar (glyco) composition of these antigens to be unique to *M. leprae*. Both antigens have been sequenced and the structures fully elucidated. They are triglycosyl phenolic phthicerol diesters with the inherent trisaccharide chains specific to *M. leprae*.

Preliminary studies by the Colorado group, in conjunction with investigators at the University of New Mexico, have shown that the pure antigens (named phenolic glycolipid I and II and referred to as Phen-GL I, II) react with pooled sera from leprosy patients and do not react with blood from patients with tuberculosis or other diseases caused by related bacteria. Thus, the investigators suggest, a purified antigen holds out the possibility that a leprosy-specific diagnostic skin test can be devised to replace the comparatively crude test now in use, in which inactivated whole bacilli are used.

The leprosy bacterium is exceedingly slow growing, taking 11 to 13 days to divide, compared, for example, with its relative *Mycobacterium tuberculosis*, which reproduces in about 24 hours. Thus, the incubation period in human beings is extremely long—from 3 to 6 years. A sensitive skin test or blood test would make it possible to detect early-stage leprosy before symptoms appeared and would be particularly useful in monitoring close contacts of persons with leprosy.

Phen-GL I is found in abundance in the leprosy bacillus itself and in infected tissue surrounding the foci of infection, since the bacterium excretes it during the course of infection. Brennan suggests that the glycolipid may play a role in the pathogenesis of the disease, perhaps surrounding the bacillus with a protective coat and blocking normal immune reactions, such as cell destruction.

The investigators plan to attempt synthesis of I and II and continue the search for additional antigens, both surface and cell wall, that are unique to leprosy.

Expenditures for Health Care Estimated to be 9.8 Percent of 1981 Gross National Product

■ An estimated \$287 billion was spent for health care in the nation in 1981, an amount equal to 9.8 percent of the gross national product. Health spending in 1981 was 15.1 percent higher than in 1980, compared with an increase of 11.4 percent in the gross national product. On a per capita basis, 1981 health spending from all sources amounted to \$1,225. Of that amount, \$524 (42.8 percent) represented spending by Federal, State, and local governments.

"These disturbing figures are the strongest argument for reforming the existing system of health care cost reimbursement," declared Health and Human Services Secretary Richard S. Schweiker. "The message in these statistics is that the policies of the past are continuing to bring us health cost increases well above the rate of inflation. The Reagan Administration stands committed to the kind of changes that will encourage cost-conscious behavior in the health care system."

The comprehensive health spending estimates cited were compiled by HHS' Health Care Financing Administration (HCFA) and have been published in the September issue of HCFA's quarterly journal, the Health Care Financing Review. The HCFA tabulation of money spent for health care in the United States in 1981 continues an annual series of reports begun in 1964. It is the most complete compilation of health expenditures available. The chart is from the HCFA report.

The HCFA figures show that combined Federal and State outlays for health care benefits by the Medicare and Medicaid programs administered by HCFA amounted to \$73 billion. This amount represents 29 percent of all spending for personal health care in the nation. Benefits from the two programs for hospital care alone amounted to \$42 billion, or more than one-third of all hospital bills paid in 1981. Personal health care, which does not include research or construction costs, totaled \$255 billion in 1981.

Following are other highlights in the report.

- The \$118 billion spent for hospital care in 1981 (17.5 percent more than

in 1980) accounted for 41 percent of total health care expenditures.

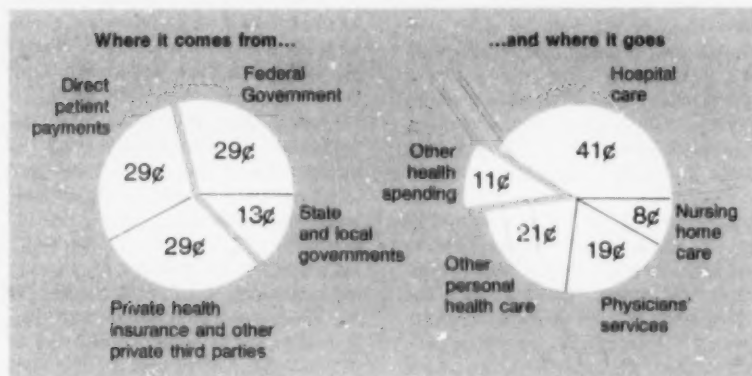
- Spending for physician services increased 16.9 percent to \$55 billion—19 percent of all health care spending.
- All third parties combined—private health insurers, governments, philanthropy, and industry—financed 68 percent of personal health care spending in 1981, ranging from 89 percent of hospital care services to 62 percent of

physicians' services and 41 percent of the remainder.

- Direct payment by patients reached \$82 billion in 1981, covering 32 percent of all personal health care expenses.

The full report in the September 1982 Health Care Financing Review (Vol. 4, No. 1) is available from the U.S. Government Printing Office, Washington, D.C. 20402. Price \$3.50.

The nation's health dollar in 1981



Alcohol Publication on Tailoring Treatment to Client Needs

■ As an aid to practitioners who must treat alcoholics with a wide variety of needs, the National Institute on Alcohol Abuse and Alcoholism (NIAAA) has published a survey of available research on "Tailoring Alcoholism Therapy to Client Needs." This is the first in a series of publications that the NIAAA will issue on alcoholism treatment issues.

As the introduction to the monograph states, "An opinion widespread throughout the alcoholism field is that treatment effectiveness will be maximized by tailoring a therapeutic approach to fit the type of client served." However, there has been little systematic review of which treatment approaches are best for which kinds of clients, and if clients vary in their response to diverse therapeutic techniques. To fill the information gap, three main client-treatment factors are examined:

- Measures of treatment outcome. These are categorized by drinking be-

havior (consumption, physical symptoms) and psychosocial functioning. Although drinking behavior "seems to more closely reflect the immediate effects of treatment than . . . psychosocial functioning . . . the use of multiple-outcome criteria appears advisable."

- Client characteristics predictive of outcome. "Measures of social stability," including older age, Caucasian race, steady employment, and stable marriage, "have been the most powerful of the sociodemographic predictors of treatment success."

- Therapeutic factors affecting outcome. "Successful outcome appears to be more closely related to treatment amount than treatment length." Due to research limitations, neither group nor individual therapy has yet been demonstrated as effective for treating alcoholics.

Single copies of "Tailoring Alcoholism Therapy to Client Needs," by Dr. Susan Solomon, Services Analysis Branch, NIAAA Division of Alcoholism Services Development, may be obtained from the National Clearinghouse for Alcohol Information, P. O. Box 2345, Rockville, Md. 20853, or telephone 301: 488-2600.

Improved Procedures for Estimating Allied Health Manpower Supply and Demand

■ As the allied health occupations continue to grow and allied health personnel play an increasing role in the health care delivery system, the need for reliable continuous data on the supply and requirements for the allied health work force becomes more urgent. A recent report by the Bureau of Health Professions, Division of Health Professions Analysis, Health Resources Administration, presents an overview of the purpose, approach, findings, and recommendations resulting from two complementary studies on the collection of supply and requirements data on allied health personnel.

Although there are more than 100 allied health occupations, the two studies and the report focused on 21 occupations, within 9 occupational clusters. The findings and recommendations, however, apply to other allied health occupations besides the nine occupational clusters. The project's purpose was to devise alternative methodological strategies for collecting manpower supply data on those occupations for which reliable national estimates are unavailable and to develop better procedures for estimating the manpower requirements for these occupations.

The report includes an overview of each of the nine occupational clusters, a definition of the population within the cluster, a description and assessment of data sources, and recommendations for estimating the supply within the occupation and current and future manpower requirements. Summaries are presented of the results of interviews conducted with persons knowledgeable about each cluster of occupations, and personnel-to-population ratios are provided for each occupation for which data were available.

Development of Procedures for Generating Alternative Allied Health Manpower Requirements and Supply Estimates. DHPA Report No. 8-82, April 1982. Division of Health Professions Analysis, Bureau of Health Professions, Health Resources Administration, 3700 East-West Highway, Hyattsville, Md. 20782. A limited number of copies of the report are available.

DHHS Begins Public Awareness Campaign on Reye's Syndrome

■ HHS Secretary Richard S. Schweiker has announced a proposed warning label and a public awareness program, including radio announcements, to alert parents that Reye's syndrome, a rare but life-threatening disease, has been reported to be linked to the use of aspirin and other salicylate-containing drugs by children under 16 years of age who have influenza or chicken pox.

Outlining his plans before a House subcommittee hearing on September 20, 1982, Schweiker said a key part of the program will be radio public service announcements that will reach parents and physicians before the next influenza season. "This public education campaign is vital," Schweiker said, "because label changes take time and we must address products already in retail stores and homes. We have to alert parents as quickly as possible."

In addition to aspirin, many common over-the-counter and prescription drugs, including some popular cough and cold remedies, contain salicylates.

The Reye's syndrome awareness campaign will enlist the help of consumer and health professional groups to circulate information to the public. Question-and-answer brochures will be sent to physicians and pharmacists. Also, a feature article on the subject published in the FDA Consumer and a column by Surgeon General C. Everett Koop, MD, will be made available to newspapers around the nation.

For nonprescription drugs, the warning label would read: "Warning: This product contains a salicylate. Do not use in persons under 16 years of age with flu or chicken pox unless directed by your doctor. The use of salicylates to treat these conditions has been reported to be associated with a rare but serious childhood disease called Reye's syndrome."

For prescription drugs, the warning would appear in the labeling for physicians and would read: "Drugs of this class, salicylates, have been reported to be associated with the development of Reye's syndrome in children under 16 years of age with chicken pox, influenza and influenza-like infections."

Reye's syndrome is characterized by vomiting and lethargy, which may progress to delirium and coma in children who are recovering from viral infections, particularly influenza or chicken pox. About 600 to 1,200 cases occur each year in the United States, most in children between the ages of 5 and 16 years. Death results in 20 to 30 percent of the cases and permanent brain damage in many others.

At the direction of the Secretary, FDA issued a Drug Bulletin with information on Reye's syndrome and salicylate use to more than 1 million health professionals. Also, Surgeon General Koop has already issued an advisory on this issue to the health care community.

Diagnostic Aid Detects Latent Heart Disease Before Symptoms Appear



Thallium scanning and electrocardiogram (ECG) monitoring during exercise, a relatively safe, non-invasive technique used to determine which regions of the heart may be deficient in circulation, is providing investigators at the National Institute on Aging's Gerontology Research Center (GRC) with a reliable tool for detecting persons afflicted with coronary artery disease (CAD), but who show no noticeable signs or symptoms of the disease.

CAD is characterized by a significant narrowing or blockage in one or more

of the three coronary arteries that normally supply the heart muscle with blood. The blockage is caused by cholesterol-laden, calcific deposits in the coronary arteries that ultimately limit blood flow to the heart. Hypertension, smoking, and elevated blood cholesterol levels are the three major risk factors that contribute significantly to the development of CAD.

Identifying persons with latent CAD is a major challenge for physicians, who realize that in some people no outstanding characteristic, such as pain, exists.

In the past, symptoms and ECG criteria for the person at rest provided researchers and physicians with a low prevalence rate for CAD, compared with autopsy data, and were particularly ineffective in identifying persons

with the disorder who were asymptomatic. A history of angina, infarction, or resting electrocardiographic abnormalities positively identifies only about half of these people.

DESCRIPTION OF METHOD

However, recent studies conducted by physician-scientists at the GRC and the Johns Hopkins University have shown that thallium scans in combination with exercise ECG can provide a more effective and accurate means of identifying latent CAD. The Hopkins team administered thallium-201 intravenously during maximal treadmill exercise to 233 randomly drawn subjects in the Institute's Baltimore Longitudinal Study of Aging; their ECG was also monitored. The combination of exercise ECG and thallium scintigraphy (scanning) evinced a much higher prevalence of CAD in each age cohort than did the standard ECG criteria for subjects at rest. Among the 70- to 79-year old group, for instance, CAD was identified in 22 percent by resting criteria. The addition of persons with a positive exercise thallium scan, plus an abnormal ECG in conjunction with resting criteria, resulted in a CAD prevalence of 56 percent in this age group.

Exercise ECG involves a regimen of walking on a sloped treadmill while the



"Exercise electrocardiography (pictured) when used in conjunction with thallium scintigraphy provides an accurate way of detecting coronary artery disease."

ECG is continuously recorded. The treadmill is gradually raised, increasing the difficulty of the task. The ECG recording indirectly indicates whether or not the heart can withstand the stress of exercise by maintaining an adequate supply of blood.

Thallium scans are relatively simple to administer and monitor. After intravenous injection during peak exercise, thallium travels to the heart, propelled by the flow of blood. The thallium, a radioactive tracer substance, produces an image of the cardiac muscle, which is then transcribed on a computer screen. Those areas of the heart that the thallium does not illuminate are deficient in circulation because of some blockage or constriction in the coronary arteries.

According to GRC cardiologist Dr. Jerome Fieg, the exercise ECG yields a diagnostic sensitivity of about 65 percent for detecting CAD in a population with chest pain. When the exercise ECG is used in conjunction with the thallium scan, however, the sensitivity improves significantly, and 80 to 85 percent of persons with CAD can be identified.

ADVANTAGES OF METHOD

Besides diagnostic accuracy and the relatively pain-free nature of the exer-

cise involved, stress thallium scans and ECG have other added advantages. They usually can be administered over a short period, require no hospitalization or extended treatment, and carry minimal safety risk. These advantages contrast with the disadvantages of angiography, the definitive test for diagnosing coronary heart disease. Angiography entails insertion of a plastic tube into the heart, normally requires hospitalization, and carries with it a small, but definite, mortality risk.

At the GRC, results obtained from the stress thallium scans and exercise ECG give researchers vital medical information. This information is needed to study the effects of disease, as compared with the effects of age per se, on the cardiovascular system.

Clinically, stress thallium scans in conjunction with exercise ECG offer physicians a practical and reliable way to detect asymptomatic CAD. This unique diagnostic aid could have a significant bearing on the health and welfare of heart patients, leading to earlier recognition and treatment and a more optimistic outlook for those afflicted with this disorder, the leading cause of death in the United States.

—JAN S. EHRMAN, *National Institute on Aging, Gerontology Research Center*

NIMH Offers Geriatric Mental Health Academic Awards to Medical or Nursing Schools

■ The mental health problems of the elderly will receive greater attention when the National Institute of Mental Health gives Geriatric Mental Health Academic Awards to 10 medical or nursing schools starting in fiscal year 1983.

The new awards will enable an expert on aging and mental health to serve as "a research-oriented resource person" on each of 10 faculties across the country. The resource person, either a psychiatrist or a psychiatric nurse, will:

- study geriatric mental health;
- instill in other researchers an interest in geriatric mental health; and
- introduce research findings in geriatric mental health to other clinical teachers and researchers in the academic setting.

"We're trying to create a cadre of

research teachers on mental health and the elderly," said Dr. Gene Cohen, Chief, NIMH Center for Studies of the Mental Health of the Aging, which will administer the pilot-stage awards.

"Our focus is not on large numbers but on a large scope of activity," he emphasized. "Each resource person will encourage the students in general training to be more knowledgeable about older people. In this way, awareness of aging may become more a part of the general curriculum."

Awards of up to \$50,000 per year will be made directly to departments of psychiatry in medical or nursing schools. The funds will support specific nominees for up to 3 years of special study and preparation as geriatric mental health resources.

Potential applicants may contact Cohen or Dr. Barry Lebowitz at 5600 Fishers Lane, Rm. 11A-16, Rockville, Md. 20857 or telephone 301: 443-1185.

—KATE CALLEN, *Alcohol, Drug Abuse, and Mental Health Administration*

Staff, Bureau Heads Named for HRSA, New PHS Agency

■ A new agency of the Public Health Service, the Health Resources and Services Administration (HRSA), came into existence September 1, 1982. "The new agency will provide leadership and direction for programs to provide direct health services for certain population groups and to develop the resources necessary for the health care system of the future," said Edward N. Brandt, Jr., Assistant Secretary for Health.

Dr. Robert Graham, who has been acting administrator of the Health Resources Administration (HRA), is the administrator of the new agency. The deputy administrator is John H. Kelso, who has been acting administrator of the Health Services Administration (HSA). HRSA's headquarters is Room 14-05 Parklawn Building, 5600 Fishers Lane, Rockville, Md. 20857.

The Health Resources and Services Administration consolidates the following programs of the Public Health Service into four bureaus.

Indian Health Service. Transfers from HSA with no change in organization and functions. The Indian Health Service will continue to ensure a comprehensive health services delivery system for American Indians and Alaska Natives. Dr. Everett R. Rhoades continues as its director and Dr. Joseph Exendine continues as deputy director.

Bureau of Health Maintenance Organizations and Resource Development. Consolidates the Office of Health Maintenance Organizations from the Office of the Assistant Secretary for Health and HRA's Bureau of Health Planning and Health Facilities. Dr. Daniel F. Whiteside has been appointed director of the bureau; Dr. Frank Seubold has been named the deputy director and also serves as associate director for health maintenance organizations. The associate director for planning is William Berry and associate director for facilities is Dr. Florence Fiori.

Bureau of Health Professions. Will provide leadership in coordinating, evaluating, and supporting the development and use of the nation's health personnel. Thomas Hatch continues as director of the bureau, and Dr. William

Robinson continues as deputy director.

Bureau of Health Care Delivery and Assistance. Combines programs from the HSA's Bureau of Community Health Services, Bureau of Medical Services, and the National Health Service Corps (including scholarships) formerly administered by the Bureau of Health Personnel Development and Service. Dr. John Marshall is the acting director of the bureau, which serves as the national focus for efforts to insure health services in medically underserved areas and to special population groups. William Aspden serves as acting deputy director.

Appointed as associate administrators of staff offices were Dr. James Walsh, operations and management; Ronald Carlson, planning, evaluation, and legislation; Paul Schwab, policy coordination; Dr. Edward Martin, clinical affairs; Keith Kost, communications; Dr. William Gemma, international affairs; and Jordan Popkin, regional affairs. Calvin Adams is HRSA's equal employment opportunity officer. Bill Evans serves as special assistant to the administrator.

Training Program to Help Illinois School Nurses Detect Spinal Abnormalities



A statewide training program for school nurses has been initiated in Illinois that will enable them to detect spinal abnormalities in adolescent students. Through the Illinois School Nurse Achievement Program, this training is being offered for the first time on a statewide basis.

During this first year, enrollment in the course will be limited to 200 nurses. They will be taught how to conduct spinal screenings and how to analyze the results of those screenings.

"We expect that, during the first year the program is in operation, the screening will be made available to about 200,000 Illinois school children," said William L. Kempiners, director of the Illinois Department of Public Health. Routine spinal screenings will be given to students in grades 5 through 9. Health officials estimate that about 12,000 of these children will show some sign of spinal abnormality and will be referred to physicians.

Study Finds Bright Light Lifts Winter Depression

■ Bright artificial light can lift clinically significant winter depression, according to a team of National Institute of Mental Health (NIMH) intramural scientists. A daily regimen of exposure to high-intensity full-spectrum fluorescent lights during the hours before dawn and after dusk effectively lengthens the period of daylight and dramatically buoys the mood of some depressed patients who suffer from seasonal disturbances, reported Dr. Norman Rosenthal and Dr. Thomas Wehr.

EXPERIMENTS WITH LIGHTS

In a preliminary study during the winter of 1981-82, 7 of 11 patients experienced such profound relief from this "photobiological" procedure that the researchers believe it may become a viable form of treatment. "The seasonal recurrence of the depression and the effectiveness of the lights may depend on a photoperiodic mechanism whereby critical changes in day length trigger behavioral changes," Wehr suggested.

The most common spinal abnormality is curvature of the spine (scoliosis), which begins in early childhood, but progresses most rapidly during the growth spurt in the adolescent years. "If curvature of the spine is detected early," Kempiners said, "it can, in most cases, be treated successfully with a back brace, and the difficult, expensive corrective surgery can be avoided."

Faculty for the spinal training course will be provided by the school health section of the Illinois State Health Department. The 2-semester-hour course will be offered seven times, between October 1982 and March 1983, at seven locations throughout the State. It is open to school nurses, public health nurses, community nurses, and any nurses who work with school-aged children. The course is offered by the State health department, in cooperation with Southern Illinois University, for either graduate or undergraduate credit.

In the fall of 1981, the NIMH investigators began studying 11 patients who met the diagnostic criteria for major affective disorder with distinct seasonal cycles. All 11 experienced high-energy levels or elation (hypomania) during the spring and summer. Depression followed in the winter, characterized by sluggishness, difficulties in work and relationships, an exaggerated appetite, and prolonged periods of sleep. Although all but one of the subjects had a family history of similar seasonal disturbances, they did not show the severity of symptoms or the sleep and neuroendocrine abnormalities that are common in hospitalized manic-depressive patients.

The depressed subjects were randomly given first one and then another of two forms of treatment with lights in their homes. Experimental white lights were used that were 30 times brighter than the dim yellow lights that served as controls (and 6 times brighter than conventional fluorescent lights). Subjects turned the lights on for 3 hours before dawn and for 3 hours after dusk. Within 1 week, all the subjects experienced some antidepressant effect from the bright lights, and all relapsed into depression again after the treatment ended. The dim yellow lights produced lackluster results; most subjects either experienced no effect from them or a deepened depression; and only one subject showed profound improvement on the standardized rating scales of depression.

Before the study, the subjects were asked to predict what effects the different lights might have. Their responses convinced Rosenthal and Wehr that the subjects were not aware of the investigators' hypothesis. The treatment evolved from studies of seasonal rhythms in animals, epidemiologic research on depression, and recent NIMH intramural findings on the effects of light on human beings.

SEASONAL MOOD CHANGES

Epidemiologic data and clinical observations have long revealed seasonal patterns in affective disorders and associated suicides. The seasonal variability of suicide rates correlates with the mean annual duration of sunshine at different latitudes. Suicide rates peak in the late spring, and the severe depressive episodes of most manic-depressive illnesses also tend to peak in the spring; winter depressives—per-

sons who experience winter depression—represent a distinct subgroup.

An assay a few years ago for the light-sensitive pineal gland hormone melatonin—developed at NIMH by Dr. Alfred Lewy and Dr. Sanford Markey—revealed that secretion of this hormone in human beings can be suppressed by artificial light of near-daylight intensity, but not by conventional artificial light (which can suppress the hormone's secretion in animals).

Animal studies have shown that melatonin has a circadian (daily) rhy-

thm regulated by light; the longer darkness lasts, the more the hormone is secreted. Moreover, the effect of light on melatonin also is the basis of seasonal rhythms such as reproduction, migration, and hibernation in animals. Melatonin can override the effect of light and mimic seasonal changes in animals' reproductive activity.

Rosenthal and Wehr found a striking difference in the annual reproductive cycle of persons who were winter depressives as compared with the normal population. In a sample of several hun-

dred winter depressives, more than twice as many conceptions occurred in August as in January—a 100 percent difference. In a normal population, the disparity is only about 10 percent.

Although Wehr suspects that melatonin secretion will turn out to be suppressed by the bright light treatment, examination of possible biochemical mechanisms can begin only after the researchers establish the role of the photoperiod more precisely.

—JULES ASHER, National Institute of Mental Health

publications

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U.S. Government Printing Office, Superintendent of Documents, Washington, D.C. 20402. Orders should be accompanied by check or money order and should be identified by title and GPO stock No.

MFT's and Wiener Spectra of Radiographic Screen-Film Systems. DHHS Publication No. (FDA 82-8187). \$5.50. GPO Stock No. 017-015-00205-5.

Changes in Mortality Among the Elderly: United States, 1940-78. *Vital and Health Statistics, Series No. 3, No. 22.* DHHS Publication No. (PHS) 82-1406. \$3.25. GPO Stock No. 017-022-00783-5.

Current Estimates from the National Health Interview Survey, United States, 1980. *Vital and Health Statistics, Series No. 10, No. 139.* DHHS Publication No. (PHS) 82-1567. GPO Stock No. 017-022-00770-3.

NIMH Public Inquiries, Rm. 11A-21, 5600 Fishers Lane, Rockville, Md. 20857 (single copies only)

A Special Report on Depression Research. DHHS Publication No. (ADM) 81-1085.

A Network for Caring: The Community Support Program of the National

Institute of Mental Health. DHHS Publication No. (ADM) 81-1063.

Consultation Liaison Psychiatry: Evaluating Its Effectiveness. DHHS Publication No. (ADM) 82-1134.

Arteriosclerosis 1981: Report of the Working Group on Arteriosclerosis of the National Heart, Lung, and Blood Institute. (single copies only). *Public Inquiries and Reports Branch, Box AT, NHLBI, Building 31, Rm. 4A21, Bethesda, Md. 20205.*

The Impact of Foreign-Trained Doctors on the Supply of Physicians. DHHS Publication No. DHPA Report No. 11-82, July 1982. *Health Resources Administration, Bureau of Health Professions, 3700 East-West Highway, Hyattsville, Md. 20782.*

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Public Affairs Committee, Inc., 381 Park Ave., South, New York, N.Y. 10016

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education notes

Family practice symposium. The Medi-
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Eighteenth Annual Family Practice
Symposium to be held in Augusta. The
symposium is scheduled for February
21-26, 1983, and will be repeated May
2-7, 1983. The program is designed to
present a broad spectrum of material
important to physicians in family prac-
tice and other specialties that provide a
substantial amount of primary care; the

major emphasis will be on differential
diagnosis and current management. This
course is approved for 50 hours of Con-
tinuing Medical Education credit. The
registration fee is \$75 per day or \$350
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The Air Pollution Training Institute. The Air Pollution Training Institute (APTI), with its associated programs, offers the widest scope of air pollution training in the United States. Funded by the U.S. Environmental Protection Agency, APTI prepares instructional material and provides technical assistance for training activities conducted in support of the nation's regulatory programs of air pollution abatement.

EPA-sponsored lecture and laboratory courses in which APTI materials are used are scheduled at several locations across the country. Self-instructional courses providing an opportunity for individual training at home or at the place of employment are obtainable from APTI. Training material is continually updated, and individual courses undergo periodic major revision.

Associated with the APTI in the conduct of air pollution training are six universities which, with financial support from EPA, serve as Area Training Centers (ATCs). The ATC role is dual: the Centers provide EPA-financed student support for graduate training in air pollution control science and technology, and they provide EPA-sponsored intensive instruction (short courses) in the same subject area. Following is a chronological schedule of the courses being offered from December 1982 through September 1983.

Information on fees, registration, faculty, and so forth, are contained in a bulletin, "Chronological Schedule of Air Pollution Training Courses, October 1982 through September 1983." To obtain the bulletin and further information, contact Registrar, Air Pollution Training Institute, U.S. Environmental Protection Agency, MD-20 Research Triangle Park, N.C. 27711.

Chronological schedule of Air Pollution Training Institute Courses, December 1982-September 1983

Dates	Course No. and title ¹	Days	Location	ATC ²
1982				
December				
6-10	427 Combustion Evaluation	4½	Cincinnati, Ohio	3
13-17	411 Air Pollution Dispersion Models—Fundamental Concepts	4½	Davis, Calif.	6
1983				
January				
10-14	L450 Source Sampling for Particulate Pollutants	4½	New Brunswick, N.J.	1
17-20	413 Control of Particulate Emissions	4	Gainesville, Fla.	2
February				
21-24	415 Control of Gaseous Emissions	4	Gainesville, Fla.	2
March				
7-10	415 Control of Gaseous Emissions	4	Seattle, Wash.	5
14-18	427 Combustion Evaluation	4½	Davis, Calif.	6
14-18	L450 Source Sampling for Particulate Pollutants	4½	Dallas, Tex.	(³)
21-24	482 Sources and Control of Volatile Organic Air Pollutants	4	Cincinnati, Ohio	3
April				
11-14	L468 Source Sampling and Analysis of Gaseous Pollutants	4	Seattle, Wash.	5
May				
2-6	423 Air Pollution Dispersion Models—Applications	4½	Gainesville, Fla.	2
17-20	415 Control of Gaseous Emissions	4	Dallas, Tex.	(³)
June				
6-9	444 Air Pollution Field Enforcement	3½	Cincinnati, Ohio	3
7-10	474 Continuous Emission Monitoring	4	Chicago, Ill.	4
13-17	L464 Analytical Methods for Air Quality Standards	5	New Brunswick, N.J.	1
July				
11-15	L435 Atmospheric Sampling	4½	Davis, Calif.	6
11-15	L450 Source Sampling for Particulate Pollutants	4½	Chicago, Ill.	4
18-21	413 Control of Particulate Emissions	4	New Brunswick, N.J.	1
August				
9-13	411 Air Pollution Dispersion Models—Fundamental Concepts	4½	Chicago, Ill.	4
15-19	423 Air Pollution Dispersion Models—Applications	4½	Chicago, Ill.	4
22-25	482 Sources and Control of Volatile Organic Air Pollutants	4	New Brunswick, N.J.	1
September				
12-15	452 Principles and Practice of Air Pollution Control	3½	Davis, Calif.	6
19-23	L450 Source Sampling for Particulate Pollutants	4½	Seattle, Wash.	5

¹ The letter L before the number indicates a laboratory course.

² ATC numbers in the far right column indicate courses conducted by Area Training Centers under EPA grant and identify the institutions conducting them, which are as follows:

1. Rutgers University, New Brunswick, N.J.
2. University of Florida, Gainesville, Fla.
3. University of Cincinnati, Cincinnati, Ohio
4. Illinois Institute of Technology, Chicago, Ill.
5. University of Washington, Seattle, Wash.
6. University of California, Davis, Calif.

³ Adjunct facility.

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Key to Classification
of Subject Index

(*)	Original, signed article
(CR)	Conference report
(FA)	Film announcement
(LN)	Legal note
(PR)	Publication review
(SR)	Short report

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